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DR. ALFRED LINGARD, M.B., M.S., F.R.C.S., D.P.H., FORMERLY IMPERIAL BACTERIOLOGIST TO THE GOVERNMENT OF INDIA, MUKTESAR LABORATORY, UNITED PROVINCES, INDIA.

Dr. Alfred Lingard was born in 1852, and entered St. Thomas's Hospital, London, in October, 1870, taking the Diploma of the Royal College of Surgeons in 1873, and the L.S.A.(Lond.) in 1874. He held the appointment of House Physician to St. Thomas's Hospital from December, 1874, to June, 1875, and in 1875 proceeded to the Continent, following up research work between the years 1876 and 1879 in Vienna, Berlin, and Paris.

Returning to London, Dr. Lingard passed the first Fellowship R.C.S. and first M.B. Durham University in 1881, and from 1882 to 1890 worked in the Laboratory of the Brown Institution under Professor Charles Stuart Roy, M.D., F.R.S.

In 1884-5 he was appointed Assistant to the Cholera Commission in India. Returning to London in 1886, Dr. Lingard took the D.P.H. Cambridge, and in 1888 proceeded to the M.B. and M.S. Durham. In 1890 he proceeded to India to an appointment in Poona under the Educational Department to work at anthrax and anthracoid diseases, and in 1892 was appointed Professor of Bacteriology and Comparative Pathology, and Imperial Bacteriologist to the Government of India.

The primary object of his appointment in India was to investigate anthrax and other diseases which might be enzootic in that country. Before his arrival in India, it had been arranged that the headquarters should be in Poona, and work carried on under the Principal of the Poona College, in a small laboratory built for the purpose on a 3½-acre patch, surrounded by four roads.

The main work—viz., the investigation of anthrax, &c.—could not be furthered in Poona unless considerable travelling was undertaken, and in May, 1891, Dr. Lingard brought before the Government of India the advisability of instituting a laboratory on a much larger

scale and capable of expansion, on a suitable site to be selected in the Hills, with a view to pushing on investigations in Northern India, in which quarter more widespread epizootic diseases in animals could be met with.

In 1892 the work of the bacteriologist was recognised by Government to be Imperial, and that it was hampered by the provincial position; further, the climate and position of Poona were not the most favourable for the working out and preparation of sera, vaccines, and other prophylactics, and there was great difficulty in obtaining the necessary material in that portion of India.

The time spent in Poona was not, however, by any means lost, for an immense amount of work was accomplished with regard to the etiology and treatment of trypanosomiasis in various animals, and Reports, vols. i. and ii. (parts 1 and 2) were submitted to Government. Unfortunately the third volume, containing a mass of information with regard to the life-history of the *Trypanosoma evansi*, *T. lewisi*, and other flagellates, together with all drawings and photomicrographs, were destroyed in the fire which consumed the Muktesar Laboratory in September, 1899.

In May, 1893, under Government of India Orders, Dr. Lingard joined Lieutenant (now Major) H. T. Pease, I.C.V.D., the Principal of the Lahore Veterinary College, and proceeded with that officer to visit various localities in the Hills with a view to the choice of a site for building the Imperial Bacteriological Laboratory. On the advice of Sir Edward Buck, Secretary to Government R. & A. Department, and the late W. B. Wishart of Cawnpore, they finally selected a site at Muktesar, situated at the top of a hill in the inner Himalayas. The buildings were commenced, and in June, 1895, although not yet completed, the staff and establishment moved to Muktesar, in order to finish the furnishing of the Laboratory and commence work. During the year 1897, Professors R. Koch, Gaffky, and R. Pfeiffer visited Muktesar, and the first named demonstrated his new process of producing immunity in cattle by means of rinderpest bile. It was not until the termination of 1898 that the Laboratory was fully furnished and complete for all kinds of investigation.

In September, 1899, Dr. Lingard was informed in London, where he was recruiting after a long and serious illness, of the total destruction of the Laboratory at Muktesar by fire, including his library and all effects. This was a terrible blow; but two and a half months later he started for Muktesar in order to rebuild the Laboratory as quickly as possible. At first all microscopical work during the winter of 1899—1900 had to be conducted at a small table in the snow, but later a small one-roomed wooden structure was erected where work was conducted between 1900 and the end of 1902. The second Laboratory was practically rebuilt and refurnished by 1903.

The real work with regard to the investigation and preparation of different sera at Muktesar commenced in 1897, just previous to the visit of Professor Koch, when he demonstrated his mode of protecting bovines against rinderpest by the subcutaneous injection of rinderpest bile. From the first it was recognised that the bile method could not make any progress in India, owing to the rooted prejudices of the native population as to the destruction of cattle for the purpose of acquiring bile. Therefore the attention of the Laboratory workers was turned at once to the preparation of a serum convenient for use in the field: that is, of sufficient protective power to confer immunity to cattle for a period of at least a month, or during the time epizootics of the disease take to pass away from a given district. The results obtained with such a serum were highly satisfactory and encouraging from the very first; year by year the amount the Laboratory was called upon to supply increased by leaps and bounds, and at the present time the annual output of this serum only, approximates to about 300,000 doses.

Editorials.

PRECISION IN DIAGNOSIS.

In the January number of the VETERINARY JOURNAL we reproduced an article by Professor Veranus A. Moore, entitled "Some Principles of Pathology Significant in the Control of Animal Diseases," in which the author emphasised the necessity for the more general adoption of methods of precision in diagnosis. We are entirely agreed with Professor Moore on this point. Members of the medical professions, both human and comparative, are constantly claiming to be regarded as scientists, and rightly so, too, considering the training they undergo before being permitted to practise their professions; and yet, we would ask, how many practitioners attempt to live up to the standard of the scientist in their everyday work? We are of opinion that there are comparatively few who are as precise as they should be, considering the ease with which many cases of doubtful diagnosis might be confirmed or otherwise by the use of the microscope, or some simple chemical test. We quite realise that busy practitioners will excuse themselves on the ground of want of time, and the idea that an elaborately equipped laboratory is necessary. The latter idea is quite erroneous, as Professor Moore

points out, and there is probably also much misconception as to the amount of time required for the simpler processes. The preparation and examination of films, for example, is a very simple process, and requires only practice to be done in comparatively little time, and the assistance one obtains inspires greater interest in one's cases, and greater confidence in treatment, since, of course, efficacy of treatment so largely depends on the correctness of diagnosis. No scientist worthy of the name would be satisfied with "rule-of-thumb" diagnosis where absolutely definite diagnosis is possible. It must not be imagined that we wish to discount in any way clinical observation. On the contrary, we only wish to emphasise that it is our duty to leave no stone unturned in diagnosing cases, and the results will be better for our patients and clients, and much more gratifying to ourselves. In the British Isles, many practitioners of veterinary medicine are awakening to the advantages to be obtained by the use of the microscope, and are attending some of the various *post-graduate* courses. We welcome this fact very heartily, and we are convinced that it portends well for the veterinary profession. We feel sure that every practitioner would feel more than repaid by making and carrying into effect a resolution *to begin at once* to use his microscope more frequently in arriving at a diagnosis.

THE EXPOSURE OF QUACK REMEDIES.

AT a recent meeting of the Veterinary Medical Association of Ireland, the Secretary stated that he had been requested to bring forward a suggestion that the contents of sundry animal patent medicines should be analysed at the expense of the Society and the results reported to the members.

In view of the large number of quack remedies on the market, it is to be feared that the cost of such a scheme would be prohibitive for any association to undertake single-handed, although much good would undoubtedly be done to the practising veterinary surgeon if only the client could be informed how harmful and useless many of the medicines really are. The scheme would, however, be practicable only if several Societies combined to

share the expense, and even if only a comparative few of the quack remedies which most commonly offend the eye were exposed, there is no doubt that a great deal of benefit to the sick animal world, and to the veterinary profession, would result. The subject is well worth further consideration, and it is one of the most important of the original ideas which this go-ahead Irish Society has lately had brought before its members. Half the sale of a quack medicine would at once be done away with if only the purchaser caught a glimpse of the ingredients before they were compounded and neatly dispensed in the bottle with the laudatory label. It is the wording of the latter, together with the inherent love that some people have for doctoring their own (or other people's) animals, which helps so materially to fill the pockets of the quack medicine vendor.

If only the contents of the mysterious "something in the bottle" could be printed on the label or exposed in the Press, the familiarity which would necessarily follow in the mind of the purchaser would give rise to a feeling of contempt, instead of the mystic awe with which most quack medicines are now revered.

VETERINARY INTERESTS IN WESTERN AUSTRALIA.

In the correspondence columns of our issue this month we print a contribution from Mr. Titus Lander, of Perth, Western Australia, in which the author points out the scandalous condition of veterinary matters in that Colony. There is no legislation on the subject at all, and the consequence is that anyone may call himself a veterinary surgeon and practise as such.

A fair example of the exponents of veterinary science in the Colony was brought before our notice recently by an extract from a Western Australian newspaper, in which were described the proceedings at the trial of a cruelty case in which the self-styled veterinarian succeeded in demonstrating clearly, in the course of cross-examination, that his knowledge even of the elements of veterinary medicine was conspicuous by its absence.

Western Australia is an extensive, although sparsely inhabited, country, and is at present in a somewhat primitive condition; but, like its sister Colonies of the Antipodes, it is only just waking up

to the fact that it possesses enormous agricultural wealth, and consequently stock-breeding and the laws relating to it are practically in their infancy. At the present time, though there is a score or more of quacks scattered over its wide area, there is not a single qualified man. The live stock of the country is subject to the same diseases as occur elsewhere; their pigs are being decimated by swine fever, and their cattle and horses are being ravaged by contagious diseases, many of which could be stamped out by proper veterinary supervision.

There is on foot in the Colony a movement, of which Mr. Lander speaks in a contemporary, for the passing of a Veterinary Bill which, should it become law, will prohibit any but properly qualified men from practising in the Colony. Mr. Lander himself is practically demonstrating his appreciation of the veterinary work which has been done in other countries by supporting the motion. There should, on the passing of the Bill, be plenty of work for several qualified men in private practice, and doubtless at an early date the Government of the Colony will appoint one or more members of the Royal College of Veterinary Surgeons to undertake the duties of inspectors, and to organise a Veterinary Department similar to that of other Colonies. This must of necessity come to pass, for although fruit-farming at present is one of the staple industries, stock-raising for the supply of meat to the British market will no doubt be the most important industry of the future, the country and climate being so well adapted for this. Without veterinary supervision the latter cannot be a success, and those members of the profession who are discontented with their prospects in this country might do worse than turn their attention to Western Australia.

THE NEW BILL.

In response to a request from a number of our readers, we hope to reprint, in our next issue, a copy of the proposed Veterinary Surgeons' Amendment Act, 1908, concerning which Mr. J. A. W. Dollar has just issued a most extraordinary circular. Mr. Dollar confesses his own culpable negligence in this matter, and is now endeavouring to obtain popularity in view of the coming election. We trust our readers will not be bluffed by him.

General Articles.

THE SYSTEMIC HANDLING OF WOUND INFECTION.

BY W. L. WILLIAMS, PROFESSOR OF SURGERY AT THE NEW YORK STATE VETERINARY COLLEGE, CORNELL UNIVERSITY.

WHEN a wound becomes infected the practitioner attempts to overcome it, so far as possible, by local measures, and in so doing goes about his task with a definite plan to combat the disease. It is doubtful, however, whether all practitioners have an equally clear conception of the systemic or internal handling of wound infection when its effects have passed, or threaten to pass, beyond the confines of the wound area to involve the entire system of the patient. Each practitioner presumably recognises the influence of the system upon the course of the local lesion. It is constantly observed in practice, that one patient having a severe and extensive wound, progresses favourably and makes a prompt recovery, while another of the same species, and with a less extensive and complex wound, does badly. Sometimes we find the difference in the character of the infection, but often the bacteriologist cannot tell us, by examining the organisms from a benign and malignant wound, to which of the two a given culture belongs, and we habitually refer this clinical difference to individual resistance, due to some peculiarity of the system. We thus recognise the fundamental proposition that in wound infection the disease may be essentially confined in its ravages to the wound area, or may involve, more or less seriously, the entire animal organism.

These variations stand out so conspicuously in everyday practice that they constitute an important element of uncertainty in prognosis. We have learned clinically to look askance upon wounds in weak, debilitated animals, while the same apparent injuries in a vigorous individual create less alarm.

Our view of these variations in the intensity of wound infection, is modified by the rule that the results are largely dependent upon the quality and quantity of the infecting agent, but this does not lessen our belief, based upon clinical experience as well as the teaching of experimental medicine, that the entire animal organism is influenced by, and influences, wound infection. Bacteriology teaches us that in wound infection systemic disturbances may result either from the entrance of bacterial products into the blood, toxæmia, or of the toxines and bacteria together—septicæmia.

After the infecting organisms, or their products, have invaded the system, any local application or handling within our power does not affect their influence upon the animal body, though their presence within the general circulation reacts upon the wound itself and tends constantly to increase the virulence in the wound area. The local and systemic infections are complementary, each contributing to the intensity of the other.

After a time the infection within the wound area may be overcome by the tissues, destroyed, and the wound permitted to heal, or ulceration, fistula, or gangrene may result. Similarly depending somewhat upon the character of the wound infection, the systemic disturbances may cease through the casting out of the infecting agent or its products,

or its destruction within the body, the patient's life may be brought to an end in virulent cases, or in some forms of infection like botryomycosis, glanders, or bursatee, it may assume a chronic state and continue for months or years.

Few phases of wound infection are of greater basic importance than its systemic handling, and yet in a large measure veterinary practitioners fail to grasp its full significance and frequently neglect to avail themselves of important means at their command for accelerating and increasing the probability of recovery. It would be extremely unfortunate if, in considering the systemic handling, we should in the least neglect or relax in the local measures which we all recognise as being of such great fundamental importance, but we hold that each phase should command our earnest attention. When the veterinarian undertakes the local handling of an infected wound he proceeds somewhat according to the following plan :—

(1) He attempts to mechanically remove the infecting organisms by free openings, followed by ample irrigation, excision or curetting away of fatally or dangerously infected tissues.

(2) The destruction of the infecting organisms remaining in the wound by the application of chemical, thermal or other killing agents, disinfectants.

(3) The prevention of fresh bacterial invasions—through wound occlusion.

We would outline an analogous scheme for the systemic handling of wound infection so soon as the disease has surmounted or threatens to overcome the local barriers provided by the tissues, and is menacing the well-being of the organism as a whole. As in the local, so in the systemic plan, we may well give first place, chronologically at least, to the physiologic expulsion of the offending agents, the bacteria and toxines, from the body. We are not aware that we can literally accomplish the former in wound infections, possibly not, though we know that in some diseases the living bacteria are expelled in the urine. Accurate data are also wanting regarding the excretion from the body, in their original form, of the various toxines arising in wound infection.

Clinically, however, we have ample evidence that those remedies which stimulate the excretory organs tend constantly to alleviate the systemic effects of the infection. When wound infection escapes the local barriers the resultant systemic disturbances express themselves ordinarily by fever and abatement of the excretions, decreased volume of saliva, diminished perspiration ; and it is a common clinical experience that the restoration of any or all of these excretory processes to the normal or hyper-normal tends to reduce the fever, and, in harmony with the amelioration of the systemic disturbances, the local conditions improve. Consequently, from the earliest dawn of surgical practice, resort has been made to those means which tend to stimulate these excretions in order to combat fever without specifying its cause.

In a measure this phase of systemic handling of wound infection receives attention through the diet, though too often perhaps without a due sense of its importance, and hence with imperfect results. Generally the veterinarian in handling wound infection suggests a laxative diet, which constantly tends to accelerate the excretions named. Possibly the average veterinarian prescribes this diet because

it is fashion, or because he believes such foods are more readily digestible, or for other reasons, more or less vague. It is true that such, as a rule, are simpler and easier of digestion, and, being so, serve as an aid to the system in overcoming wound infection, whereas a food difficult of digestion undergoes bacterial decomposition in the digestive tract, elaborates poisons where nutrition is needed, and serves to intensify the systemic disturbance due to the wound infection, instead of relieving it.

The veterinarian should not only advise, but insist upon a proper diet for a horse suffering from a severe wound, be it surgical or accidental. The natural laxative foods for the horse consist of grass, vegetables, roots and fruits. In summer, when available, fresh grass constitutes the best food in the majority of cases for horses invalided by wounds, and in winter the place of this is best filled by carrots or turnips, or vegetables like cabbage, or less effectively by potatoes or apples.

These foods, as well as properly prepared bran mashes, tend constantly to arouse the functions of the skin, kidneys and bowels to greater activity, and in many cases of very severe wounds these precautions alone, so far as systemic handling is concerned, suffice to keep the animal organism in normal order, and prevent an accumulation of toxic products within the system sufficient to induce fever.

In other cases we need, through artificial stimuli, to arouse the dormant or overwhelmed excretory organs to unusual vigour in order to avert threatened disaster. In this manner such stimulants as alcohol, camphor and coffee, so highly recommended by Fröhner and others, possibly exert their chief influence, while others believe they act as antiseptics.

The greatest exit for waste solids and liquids from the body is through the alimentary canal, and hence it has long been the custom, in some classes of wound infection, to administer purgatives. We witness this familiarly enough in the aloetic purge usually given in lymphangitis in the horse, and perhaps even more commonly in such infections as mammitis in dairy cows, a disease essentially parallel to wound infection of local origin, and referable to the ordinary bacteria responsible for wound infection. Purgation has, however, been difficult, tedious, uncertain, and sometimes unsafe in the horse, and hence has not been so freely applied as in other animals and in man. We regard this difficulty as having been well overcome by the addition to our materia medica of a number of powerful vegetable alkaloids capable of inducing purgation promptly, certainly, and safely.

With such drugs as eserine, pilocarpine, and arecoline, the veterinarian has at his command agents with which he can induce such a degree of purgation as desired within an hour or two without inducing great excitement or depression. We know quite well that there are those veterinarians who have a dread of the action of these drugs, drawn from their experience or observation, but, so far as we have been able to determine, their fears have been aroused through errors in dosage or otherwise. In our hands, in small doses, repeated and increased, as the case may demand, we have found them free from danger and unpleasant consequences, far safer than aloes, and so prompt that their action may be obtained before the crisis of the disease is reached, instead of enduring the vexatious and ofttimes dangerous delay in

case of aloes. Not only do these arouse the intestinal secretions, but they stimulate as well the skin, liver, and salivary glands. It seems to us that in such wound infections as lymphangitis in the horse, where aloetic purgations hold a high repute, far better results are attainable by the more prompt action of some of these highly active vegetable alkaloids.

Apparently they have been little used in wound infections, but to us they seem to richly invite an extended clinical trial. In our experience, the most thoroughly illustrative case of the use of any of these was that of eserine and pilocarpine in the handling of acute mammitis in a cow, which, although not in the animal to which our paper is specifically devoted, is yet so suggestive that its inclusion seems warranted by analogy.

The cow, a profuse milker, weighing 1,000 lb., had calved on March 6, 1900, and later in the day had been submitted to the Schmidt (potassium iodide) treatment for severe parturient paresis, to which there was prompt response, followed on the 7th by mammitis on the left side, and on the 8th by intense mammitis involving the entire gland, which was greatly enlarged, hot, and tender. The milk was flocculent, yellowish in colour, and contained great numbers of micrococci. Temperature at noon 103° F., muzzle dry, appetite in abeyance, general depression. Into each quarter of the udder there was injected half a pint of a 10 per cent. solution of hydrogen peroxide, and externally there was applied, with massage, equal parts of tr. camphor, fl. ext. belladonna, and olive oil. Hypodermically we gave 2 grains each of eserine sulphate and pilocarpine hydrochloride.

At 6 p.m. the temperature had risen to 105·8° F. The patient was down, and required urging and assistance to get up, was very greatly depressed, listless, and wholly inattentive to her calf. The swelling and tension of the udder had increased. The indications pointed to mammary gangrene and an early fatal termination. The bowels had moved but little. The previous dose of eserine and pilocarpine was repeated.

At 8 p.m. the bowels had moved freely, the temperature had dropped to 103·4°, the tension of the udder had diminished, the cow was showing some maternal instinct. The eserine and pilocarpine were repeated for a third time. Throughout the course of administration the eserine and pilocarpine had acted reliably, promptly, and efficiently. Within a few minutes after administration vigorous peristalsis was clearly recognisable in the intestines, and especially in the rumen.

On the morning of the 9th the patient was essentially convalescent, her appearance was bright, appetite good, temperature normal, the mammary tension had disappeared, the milk secretion, still abnormal, had greatly improved in quality and quantity, and from this period forward the limited mammitis gradually receded.

We believe we were correct in attributing the result to the effects of the eserine and pilocarpine. The case appeared to us hopeless by any ordinary method; we had no faith in the intermammary injection, for it could not be forced into the tumefied infected acini, nor could we hope for good to come from the external application.

We do not pretend to state the exact manner in which these drugs

act to overcome infection or its effects upon the system. It is not the purgation alone, for that is not essential. In indigestion this is well observed. We do not need to purge an animal nor induce narcosis. If we arouse a peristalsis equivalent to the normal, the indigestion and colic cease, the tympany vanishes, the fermentation of alimentary contents disappears, the peristalsis or some functional activity associated therewith has proved an efficient and prompt antiseptic. So, in wound infection or similar bacterial invasions, it may not be the purgation, or salivation, or perspiration, but some quite as potent arousal of a functional activity, undefined as yet, in the tissues and organs of the body.

But the clinical fact which should impress us most is that the maintenance of the normal functional activities of the excretory organs by judicious diet, or their arousal to their normal or hyper-activity by stimulation, is of essential importance in the handling of wound infection, and that the practitioner is derelict in his duty whenever he neglects these important measures. We consider drastic purgation an equally pernicious extreme to neglect, but commend rather such maintenance or stimulation of excretory activity as a proper study of the case indicates, from the normal peristalsis to moderate purgation unaccompanied by distress or depression.

This can be accomplished in the horse usually by means of three-fourths to one and a half grains each of eserine and pilocarpine, beginning with a safely small dose, and repeating, and, if need be, increasing the amount until the desired effects are obtained.

In equine practice it has been too largely our custom to rely upon those purgatives which, if they act at all, do so violently a day or two after administration, when many of our patients should really be convalescent instead of in the throes of superpurgation. Prompt, moderate, and gentle catharsis has been little studied and less practised, though, in our judgment, it has great value, not alone in wound infection, but wherever circumstances call for the prompt elimination of disease products and of aliment contained in the digestive tube which can only unfavourably affect the system while remaining in a putrefactive state.

In wound infection also the introduction into the system of a normal salt or physiologic saline solution has been highly recommended by some practitioners. In many respects its action seems somewhat comparable to that of eserine, pilocarpine, and arecoline. Apparently it exerts a powerful stimulant effect upon the excretory organs, and tends to overcome the depression arising from severe wound infection. Its use has been largely limited to critical cases where immediate stimulation is essential for avoiding impending death. The available data upon the subject scarcely suffice as a reliable basis for judging of its comparative merits, and it deserves more extended clinical study as related to wound infection in horses.

In suggesting a common plan for the local handling of wound infection, we placed in the second position disinfection, the killing of the pathogenic bacteria and destruction of their toxines in the wound; in the systemic handling we may in an analogous fashion ascribe to disinfection the second position of importance.

At the very outset, however, the question may arise, Can we successfully apply systemic disinfection? The answer must be in the

affirmative, in some cases, at least. In the malarial diseases of man it is generally, if not universally, conceded that quinine destroys the plasmodium. In human syphilis mercury and iodine are claimed to have an actual bactericidal action upon the micro-organism of that affection. Among the diseases of domestic animals, probably, the two in which systemic disinfection has been most clearly demonstrated clinically are actinomycosis and botryomycosis, both wound infections of a chronic type. Chronic infections offer better opportunity for clinical study because of their long duration and horizontal course, but, in our judgment, we may just as truly disinfect the system in acute infections.

Actinomycosis, because of its nature and its known bacteriology, offers especially favourable opportunities for a clinical study of the effects of *systemic* medication upon *local* infection. For some decades it has been recognised that systemic medication with iodine exerts a specific bactericidal effect upon the pathogenic organisms, localised in a manner which might almost be termed extra-systemic. Their massing in somewhat isolated groups would suggest extraordinary difficulty in reaching them through drugs introduced into the system without jeopardising the life of the patient, and yet it is, of all animal diseases, the most uniformly recognised as being subject to disinfection through the system.

Next to actinomycosis, and in a sense of even more interest in our theme, is botryomycosis. This malady we know as a wound infection, almost wholly limited to the horse, and behaving very much after the fashion of actinomycosis.

Some investigators assert that it is caused by a specific organism known as the botryomyces equi, while others contend that the affection is due to a form of bacteria not distinguishable from those met with frequently in ordinary wound infection, and that the disease acquires its clinical characters from the peculiarities of the reaction of the tissues of the horse to bacterial irritation. For our purposes we may well leave the biologic controversy wholly to others, and concern ourselves with the important fact that botryomycosis of the horse is a wound infection, and that it departs but little, if at all, in its biologic characters from purulent wound infection, and that, nevertheless, it is amenable to systemic disinfection by the same drug as actinomycosis —iodine.

The specific effect of iodine, in the form of potassium iodide, upon this disease has been well known and recognised by numerous veterinarians for several decades. We have had occasion to use the drug in combination with operative interference in numerous cases.

In one instance there entered our clinic, on October 3, 1906, a horse showing an old indurated scar from fistulous withers, a similar record of prior poll evil and a small abscess upon the poll. With free incision and severing of the ligamentum nuchæ, followed by daily disinfection, the poll evil had apparently recovered by January 5, and on March 12, 1907, the patient was again presented for treatment of fistulous withers. Again free opening of the abscess was followed by healing, but the sclerosis of the tissues persisted until we eventually prescribed iodide of potash in half ounce doses for sixteen days, which caused a disappearance of the induration, a markedly increased vigour of the patient and a permanent cure of the poll evil and fistulous withers. In

this instance the poll evil and fistulous withers had apparently been alternating for a time prior to entrance in our clinic, and throughout the induration of the tissues had remained, accompanied by a definite wound infection cachexia, with debility and emaciation. The action of the iodide to all clinical appearances was specific, dissipating at one and the same time the wound cachexia and the localised chronic infection. Not alone was it clinically demonstrated that the iodine introduced into the system had accomplished disinfection in a peripheral part of the body, but it had surpassed the efficiency of locally applied disinfectants and had accomplished what the latter had failed to do. The results intimate that the infection had become disseminated amongst the living animal tissues, and had penetrated an important distance beyond the wound surface, so far that the local application of the disinfectants was impotent.

Another clinical observation illustrative of this disinfectant action was afforded by a gelding, aged 4, entered February 8, 1897, with a pectoral fistula into which a probe could be passed some 8 inches. The history of the case as related by the owner was that the animal had received a wound in the pasture when but 3 months old, presumably from a snag, and that a digital exploration of the wound failed to reveal any foreign body or other noteworthy conditions. The wound healed promptly and so remained for more than two years, but the animal showed intermittent lameness. Finally, when about 3 years old, recurrent abscessation in the pectoral muscles became established. First, the animal would become severely lame, the pectoral muscles would become swollen, tense, painful, an abscess would mature, rupture and discharge a small amount of pus, while the lameness would disappear and the patient return to work for three to four months, when the previous clinical history would repeat itself. Once Professor Law had opened the fistula and failed to find any cause for its recurrence, despite a diligent search. All this time the general health of the patient was excellent; he was fat, vigorous, and had a healthy, glossy coat.

Believing from the history that a foreign body was deeply lodged in the part, we secured the animal and carefully traced the tortuous fistula then present for a distance of about 8 in. across the long axis of the sterno-aponeuroticus muscle and to a depth of 2 in., looking in vain for the suspected foreign body, and finding nothing to warrant the continuance or recurrence of the fistulous tract. The wound healed tardily, its margins became swollen, indurated, and on the whole the wound seemed very irresponsive to disinfectants.

On February 13 the patient was put on 4·8 drachms potassium iodide daily, while to the wound was applied an iodine and potassium iodide solution. The result was quickly apparent; the wound margins softened rapidly and soon became reduced in volume to the normal, while the granulations assumed a healthy aspect and the wound cavity closed rapidly. The result was a prompt and enduring recovery.

Quite parallel in many respects was the case of a draft gelding, aged 8, used on a nursery farm, which had been lame for two years, much of the time to a sufficient degree to put him out of work. Along with the lameness there was recurrent abscessation of the flexor tendons a few inches above the fetlock, where, at the sides, close to the suspensory ligament, small abscesses would form, mature, rupture,

and leave a slowly-healing fistula and a slight degree of permanent induration. The abscesses and fistulæ had been handled by a neighbouring veterinarian without result.

When presented, March 25, 1903, there was present a small fistula above the fetlock from which there was a slight discharge of thin pus, the animal was unworkably lame though in excellent general condition. Secured upon the operating table, the fistula was opened freely, but nothing discovered to explain its persistence or the recurrence of abscesses. The wound was dressed regularly with tinct. iodine, but the progress was unsatisfactory in relation to suppuration, healing and lameness.

On April 10 we began a course of potassium iodide, administering 1 oz. daily till 14 oz. had been given. Again the clinical evidence of the disinfecting power of the drug was strong and the progress of the case was fairly rapid and uninterrupted, so that the wound was soon healed, and later the patient was turned to pasture where he could be watched, but there was no recurrence of the abscesses and the lameness gradually receded until he was returned to work the following autumn permanently recovered.

In another case, while the result was unsatisfactory, the internal medication was nevertheless interesting. The patient was a gelding, aged 6, entered in our clinic October 31, 1899, the owner having procured the animal during the previous winter, and soon afterwards there occurred an abscess in the right flank, followed by a fistula, and later another abscess occurred in the left flank. The horse was somewhat thin in flesh, but looked well, though perhaps moving a trifle stiffly. In each inguinal region was a fistula through which a probe could be passed up to and through the inguinal ring. There were no inguinal tumours. Manual exploration *per rectum* revealed two large, indurated masses projecting upwards from the abdominal rings, the tumours being some 4 in. in diameter and projecting upward half-way across the pelvic cavity, largely obstructing it. The tumours were very hard, somewhat uneven and conoid, the base of the cone resting upon the abdominal ring. Behind these two basic tumours other fibroid abscesses could be detected beneath the peritoneum, upward and forward along the abdominal walls, varying in size from 2 or 3 to 5 in. in diameter.

Diagnosis.—Scirrhous cord (*botryomycosis*) following castration, probably four or five years before. The absence of inguinal tumours suggested that, scirrhous cord having occurred, the external tumours had been excised close against the abdominal ring, converting the case into what we might term internal or abdominal scirrhous cord.

The revelations of rectal exploration made operative interference virtually hopeless, and, instead, relief was sought by means of the internal administration of potassium iodide. The patient, weighing about 1,000 lb., received 1 oz. on November 1, 2 oz. daily until the 5th, when it was omitted until the 7th, when 2 oz. daily were again given till the 16th, then discontinued till the 20th, after which 1 oz. daily was given till December 10, when its discontinuance was necessitated by the advent of iodism. In forty days the patient had received 48 oz. of potassium iodide, with but slight iodism evidenced by loss of appetite, lachrymation, and nasal discharge. Within five days the tumours emanating from the internal inguinal ring were markedly

softer, though not perceptibly smaller, and in eight days they were definitely decreased in size, and for a time they continued to diminish in volume and soften in consistency, but the effect was not continued nor efficient. The effect was clear enough, but could not be pushed to complete elimination.

Under chloroform two of the abscesses beneath the peritoneum were opened through the abdominal wall, an assistant with his hand on the tumour, *per rectum*, directing the incision. In the same manner one internal inguinal tumour was incised, but the pus cavity not found. Several times efforts at evacuating tumours by incision were made with varying success. Once we observed the rectal expulsion of pus, evidently the result of the rupture of an abscess into the rectum or floating colon. Wound infection cachexia gradually became evident, the appetite capricious, emaciation marked, the movements of the animal slow and stiff, and on April 4 he was destroyed.

Autopsy revealed extensive peritonitis; adhesions were present between the colon and diaphragm, with abscesses in their walls. Adhesions were present between the fourth section of the colon and the duodenum. The liver was adherent to duodenum, stomach, and diaphragm. The fourth portion of the colon was adherent to the right kidney, which latter contained an abscess weighing about 10 lb. Abscesses varying in size from 1 to 5 in. in diameter were found in the diaphragm, spleen, between stomach and spleen, in the pelvic connective tissue, between the bladder and pelvis, causing adhesion, and beneath the peritoneum here and there along the floor and walls of the abdomen from the pubis to the sternum.

The abscesses all had the characteristics of botryomycosis, thick, yellowish pus, variable in quantity, and very thick, fibrous, indurated walls. The combined weight of the abscesses was estimated at 40 lb.

We here had to contend with a volume of infection beyond the power, so far as we now know, of systemic disinfection, and presented insurmountable operative obstacles, yet the specific effect of the iodine was present and clearly recognisable.

Reasoning from these clinical evidences of the efficiency of potassium iodide in chronic purulent infections, we have made a general application of these facts to the handling of acute purulent infections occurring as a sequence to surgical or accidental wounds.

Illustrative of this use is that of extensive purulent infection in a colt, aged 2, following castration, the scrotum being greatly swollen, the colt weak, with loss of appetite, high fever, and profuse suppuration. Rectal exploration revealed an abscess 6 in. in diameter extending into the abdominal cavity from the internal abdominal ring, whither the infection had travelled along the spermatic cord.

Along with rigid local disinfection, the colt was given ½ oz. of potassium iodide daily for about two weeks, during which time the intra-abdominal tumour gradually receded, and finally disappeared, while the systemic disturbances gradually abated, the appetite returned, and complete recovery took place.

Similarly we frequently prescribe potassium iodide in cases of extensive suppuration of wounds with serious systemic complications; in infected wounds of tendon sheaths, whether operative or accidental, in threatened chloroform pneumonia, and the like. In other cases we rely upon quinine as an internal antiseptic, in preference to, or in con-

junction with, the potassium iodide, which may be well illustrated by the following case:—

A mare, aged 4, affected with nymphomania, was entered in our clinic, May 28, 1907, for ovariotomy, which was performed on the following day. On May 30 her temperature was 101·5° F., and on June 1, at 3 p.m., it was 103·3°, the abdomen tense and tucked up, tender on pressure, respiration shallow, pulse weak and thready, appetite in abeyance. A diagnosis of extensive septic peritonitis was made. She was given 1 oz. potassium iodide and 1½ oz. quinine. At 7 p.m. the temperature had not improved, and another 1½ oz. quinine was given. At 11 p.m. the temperature had reached 104°, the expression anxious, pulse very weak, no food or water taken. A third dose of quinine was given with 1½ oz. alcohol, making a total of 4½ oz. quinine in eight hours, to a mare weighing less than 1,000 lb. Up to this time the symptoms had indicated an early fatal termination, as she was failing very rapidly; but now her fever abated, and on the following morning she appeared bright and comfortable, temperature 102°, appetite fair, and general indications good. During the day she received 3 oz. of quinine and one of potassium iodide. During this and the preceding day she had received enemata of warm sodium bicarbonate solution.

On June 3, in the morning, the temperature was normal, and at 8 p.m. it had again risen to 102·8°, accompanied by colic, on which account she was given 1½ oz. powdered ginger and 2 oz. quinine, which afforded relief.

June 4, at 8 a.m., the temperature was 101·5°, with good pulse and appetite; 1½ oz. potassium iodide was given. At 8 p.m. the temperature was 102·8°, and 1½ oz. quinine sulphate was administered. On June 5, 6 and 7, slight fever was present, but the patient was bright, appetite good, and bowels moving normally. During this time she received daily 1 oz. potassium iodide and 1½ oz. quinine, after which medication was discontinued, and recovery was uneventful. This small animal had taken, between 3 p.m. on June 1 and June 8, 15½ oz. quinine and 6½ oz. potassium iodide.

We could enumerate many cases of a similar character, but they could not well be more illustrative. In many cases of acute septic fever we administer the quinine alone, and have similar results, though we frequently think the combination advantageous. When the infection is acute, the fever high, and the case critical, we prefer the quinine; when not so urgent, and more deliberation is practicable, we prefer the iodide, and now and then we see fit to combine or alternate them.

Our dosage, it will be observed, is quite in excess of that recommended by writers on materia medica. Ours may be larger than advisable. In disinfection, according to our view, we must introduce into the mass to be disinfected an amount of the drug sufficient to induce the desired result. If we take a jar of infected bouillon and attempt to destroy its bacteria, should we add a volatile disinfectant drop by drop, slowly, the first may volatilise and escape before the succeeding drops have entered the mass, and a sufficient concentration to disinfect may not occur, although more than enough of the disinfectant has in time been used. In the animal body most disinfectants are rapidly excreted, and if given in small doses, too far separated, may never reach that concentration essential to efficiency, regardless of the total volume eventually consumed.

Others plead expense as an argument against these drugs in the quantities named, but we believe that this is not well grounded. Drugs are cheaper than calls or failures. The expense is by no means excessive, and, compared with many forms of treatment, is very economical. The sera advertised for similar purposes are far more costly, and yet find advocates, even though probably far less efficient.

Many would hesitate to administer such doses, lest they prove toxic. The horse is almost immune to the toxic action of iodine, and when iodism finally occurs as a result of heavy administration it is confined to a brief loss of appetite, with slight flow of tears. Strangely enough, some writers give a larger dose for the ox than the horse, when the latter will withstand five to eight times the quantity that the former can endure.

The horse also has a high power of resistance to the toxic effects of quinine. Rarely by heavy dosage we have noted trembling of the limbs, unsteadiness, and more or less profuse diarrhœa.

The efficiency of quinine in wound fever in the horse has been denied, but usually on wholly inadequate grounds. We find the small doses usually recommended for these cases wholly worthless, and a waste of the drug, and only get the desired results when it is rapidly pushed to or near the physiologic limit. That limit is to be determined separately for each case. In the instance mentioned of septic peritonitis the amount of quinine given probably seems to many as unwarranted and unsafe. It was neither, as is amply shown by the results. Here was a critical case, apparently doomed to early death, local disinfection insurmountably barred, and some mode of systemic disinfection offering the only shadow of hope for the life of the patient. In our observations, the more intense the infection the larger dose required, and ordinarily the first symptoms of toxic action do not appear until the septic condition has been overcome or controlled.

Various other drugs are highly recommended for these uses by writers and practitioners. Among these are calcium sulphide and sodium sulphite, but we have not been able to observe good clinical evidence of their efficiency.

Fröhner and others highly recommend camphor and alcohol, both of which are doubtless good, and especially the latter.

More recently animal sera have been proposed and commended by some, but their use is as yet in the experimental stage. The antistreptococcic and polyvalent sera are offered as effective remedies against wound infections, but they have not yet won general confidence. The profession, as a whole, probably admits the basic correctness of the theory, but are not yet ready to accept in practice the products offered. Wound infection is an extremely variable condition, due to a well-nigh endless variety of organisms, and, while most practitioners might accept the protective serum made from a given form of bacteria for infection due to that species, he does not know, as a rule, the species with which he is dealing in a given case, and is not ready to rely upon a serum made from other species. The polyvalent serum, to the average mind, adds to complexity without heightening efficiency. The problem of serum therapy in wound infection is one of great importance which may ere long prove of great practical utility.

We have brought forward this subject not to in any wise supplant

the proper local handling of wounds, in many cases that alone suffices abundantly, but in others, like in the spayed mare above related, with septic peritonitis, no opportunity for local disinfection is presented, and entire reliance needs be placed upon systemic disinfection. A large proportion of instances of wound infection present neither of these extremes, but occupy a middle ground where both local and systemic handling are available and demanded, but on the whole we have greatly neglected a clinical study of the problem presented.

MANAGEMENT AND TREATMENT OF THOROUGHBRED BROOD MARES AND YOUNG STOCK.

BY WALTER RUSSELL, F.R.C.V.S., DUBLIN.

OWING to the unparalleled successes of Irish-bred horses on English and French racecourses during the past ten years, not to mention the great demand that exists in two Continents—Europe and America—for their acquisition, both in the capacities of sires and brood mares, we have now few more important industries than horse-breeding.

It is an interesting occupation for those who have patience, and the necessary capital at command, but anybody who engages in the fascinating enterprise must be possessed of an amount of determination and perseverance probably uncalled for in any other undertaking. Granted even that these characteristics may be present, allowances must be made for disappointments—and, indeed, these are many, but while no mortal can lay claim to command success, he can at all events do sufficient to deserve it. The principle should be adopted that quality rather than quantity be the ideal aimed at, and to achieve this desideratum the following necessary and fundamental laws are of paramount importance, viz. :—

(1) To breed solely from the very best mares obtainable.

(2) To breed from a stallion who was not a success on the Turf, or who has not sired winners, provided always he has been given the necessary opportunities, is almost, if not invariably, courting failure ; and

(3) To give the produce the greatest attention as regards food, hygienic surroundings, environment, &c.

SELECTION OF A MARE.

There is an old and proven saying that "like begets like" ; therefore, the first object of the breeder should be to select a mare of the right sort. She ought to possess the best strains of blood, and should have either shown form herself or, if she has been already at the stud, have produced winners—this latter fact will, naturally, enhance her value. As to conformation and outline, she should have a clean-cut head, poised on a well-formed neck, springing from oblique shoulders ; a good, strong back, terminating in a long quarter, with a well-set-on tail ; a deep round set of ribs closely coupled between the last one and the angle of the hips. Narrowness of the quarter is one of the worst faults in a brood mare, as it gives rise to difficult parturition (especially in the first foaling) and not infrequently to fatal results, the foal being

too large to pass through the small pelvic cavity. This passage widens as the mare goes on breeding. Good shaped legs, short shin, plenty of bone, with the pastern not too long or too short, too upright or too oblique; and, above all, good sound feet stand as a *sine quâ non*. If the mare has bad feet she nearly always transmits a like defect to her stock. As regards her hind extremities, she should possess broad hocks close to the ground, and placed not too far away from her; and have neither spavins nor curbs. Needless to remark, she should be free from hereditary disease, viz., roaring, whistling, cataract, ringbones, sidebones, navicular disease, and spavins.

A mare's mammary gland ought always to be examined to ascertain whether it is developed on both sides; also, when possible, the condition of her last foal. This will enable one to judge what nourishment it received from the dam.

Advice as to Buying Mares.

One should abstain from buying mares which, according to the Stud Book, have been returned repeatedly as having slipped foals, been barren, or slipped twins. Caution should also be exercised as regards mares that are returned as "unbroken or never trained," as this, in the majority of cases, betrays constitutional weakness in their youth. Some authorities do not like mares resembling in shape and manners those of a stallion, and, *per contra*, reject horses with effeminate characteristics. It is an acknowledged fact that external development, *i.e.*, colour, constitution, shape and conformation, follows the sire; while intern development, *i.e.*, temperament, vice, action and speed, is inherited from the mother.

Imperfect conformation, constitution or temper cannot be changed immediately by the mating of two animals having opposite defects, but they can be greatly corrected by the choice of a sire possessing perfect symmetry, and excelling in the points which the mare lacks.

Prepotency, or the power which an animal has of impressing its progeny with its own distinctive marks, is as well evinced in a sire as in a mare. There are some families which have the power of prepotency in a marked degree. Prepotent mares, if they have been successful on the Turf, or as matrons, are eagerly sought after, especially by those who are establishing a stud farm and by an owner of a sire who desires a practical advertisement for his horse. This, of course, is apparent for the reason that the produce, while embodying the good points of the sire, will also display the sterling merits of the dam to advantage.

The Best Age for Breeding.

Next comes for consideration the age that animals should be bred from. Fillies can breed from two years, but this is far too young, as the animals' frame and constitution are not fully matured. Hence, the produce is likely to be a sickly foal, and the mare thrown back for a considerable time. Some people put two-year-olds to the horse and then rest them for a year; they are of the opinion that by doing so the generative organs are developed and the mare is certain to be a constant breeder afterwards. The same plan is also adopted in fillies which are slack of their loins. Immature or old animals, as well as those that have undergone severe work and hardship during their

career, nearly always get weakly stock. This is one of the theories set forth for mares that have been kept a long time in training being a failure at the stud, the cause assigned being that their generative organs are somewhat atrophied.

Mares breed up to 25 years of age, sometimes, but after 14 or 15 the produce is not so strong or healthy, and from a racing point of view is practically useless. Certain owners will not breed from a mare over 10 years of age, as they claim to have worked out, by statistical compilations, that the majority of the classic races have been won by a third foal.

Signs of Œstrum.

In a maiden mare the mammary gland becomes enlarged and, maybe, congested. It secretes a fluid more or less resembling milk. The mucous membrane of the vulva and vagina in all mares shows signs of congestion and is of a deep red colour. Oft-repeated attempts at micturition are made, but only small quantities of urine passed; frequent erection of the clitoris takes place, and there is a discharge of an opaque whitish colour. The temperament of the mare may become altered, and animals, naturally quiet, become extremely irritable and vicious—and *vice versa*. There is a natural desire for the opposite sex.

The Selection of a Sire.

Every man has an opinion as to his ideal sire, but when a sire becomes fashionable, *i.e.*, when his progeny have won important races, he is sure to be in great demand. A stallion should have quality, symmetry, size, and good action, and be free from hereditary disease, such as roaring, whistling, cataract, ringbone, sidebone, spavin, unsound feet, and navicular disease.

Stallions, it may be mentioned here, have greater power of procreation than mares. Many commence stud life early and continue until an advanced age, as, for example, St. Simon, Gallinule, &c. Gallinule is in his twenty-second year, is still a good coverer, fruitful, and this year heads the list of winning stallions in England, his produce having won close on £21,000, and since he began stud life they have accounted for 416 races, aggregating in value £200,164.

Service Trials.

For a mare who has recently foaled, the best time to put her to the horse is about the ninth day following, but there are some cases which do not come round until the tenth or eleventh day, and a not very general practice, but one that I have seen resorted to, is to again show the mare the horse on the fifteenth. There is no doubt the most important is the twenty-first, as a trial day, to see if the mare has kept the first service, and regular breeding mares, if in good health, may be considered to be in foal if they pass this trial. For mares that have had a difficult foaling the twenty-first seems to be the proper date, as the generative organs have had time to recover their tone, and any abrasions and lacerations of the mucous membranes are by that period healed. The twenty-fifth day is the next time a mare should be tried, and after that the thirty-first. It is taken as a strong indication that the mare is in foal if she passes this day, but should be tried again on

the forty-second, and if she then refuses the horse she may be considered in foal. Many mares break on the sixtieth day, but such are generally cases of abortion which have been unobserved.

The length of time a mare remains in use is usually about four days. However, a great many possess idiosyncrasies and only remain one, two, or three days in that condition. The stud groom must be ever vigilant to catch them; any laxity on his part would explain the reason why several mares supposed to be stinted are really not. Each mare should be tried by a "teaser," as there are several that are in use but show no outward signs, such as discharge from the vulva.

One of the commonest errors some stud grooms make is forcing the horse on young mares. When they are not in season they are generally of a nervous temperament, and through rough handling of grooms, or owing to the over-anxious stallion, are apt not to become in foal. A little trouble should be taken to see that they are properly "teased." Some of them are inclined, so to speak, to "sit down" on the sire during copulation, and in doing so have from time to time caused serious damage. Another reason for mares not getting in foal is on account of the use of the twitch during covering. This method of restraint should only be resorted to in the case of vicious mares, for, taking into consideration the acute agony a mare is in during its application, it is unlikely, under the circumstances, that conception can take place.

All mares should be properly hobbled, no matter how quiet they are reported to be. Last season I saw the thoroughbred sire, Lesterlin, sustain a compound comminuted fracture of his near fore radius which extended to the knee-joint. I had to have the horse destroyed.

Artificial Insemination.

For mares that are difficult to get in foal, or that are "shy breeders," artificial insemination should be tried. In all breeding establishments conducted for profit it is a matter of the utmost importance to have a high percentage of foals annually, and a great many owners to secure this resort to artificial insemination. On the introduction of the vaginal speculum during œstrum the condition of acute hyperæmia will be observed, the cervix and frequently the continuous vaginal mucous membrane will be engorged thicker than in health, and glued together with a thick mucous or muco-purulent discharge. The neck of the uterus has often a yellow, flabby, unhealthy appearance, and may be displaced to right or left, or abruptly turned upwards or downwards; it may be rigid, or the formation of a false membrane which occludes the orifice may be observed. Scirrhous *os* may often exist in mares that have had a difficult parturition, this being due to lacerations and cicatrisation. We may also find a dilated *os* which cannot retain any semen when passed. Many cases of sterility are due to the secretions of the vagina and the womb being acid and destroying the spermatozoa. I have seen one case of an imperforate hymen.

Modus Operandi.

The hands of the operator should be clean, and he should have two perfectly clean buckets of warm water. To this is added some soda bicarbonate in order to neutralise the acid secretions. Place the speculum

and syringe in one bucket, and three or four tampons of absorbent cotton-wool in the other. With these thoroughly cleanse the cervix and the vagina of all secretions. This will require to be repeated on three or four occasions to have the desired effect, as it is necessary to remove all moisture. At the same time the *os* must be gradually dilated, when necessary, by means of a rotary manipulation, the hand being formed into a cone.

The best speculum on the market is made by Messrs. Arnold and Sons. It is composed of two expanding arms and a spoon-shaped body, at the end of which is a depression or cup, so that when there is a plentiful emission of semen it can be conveniently collected, taken up by the syringe and injected into the uterus.

If the mare to be operated on cannot retain the semen, it must be caught as it is expelled in a warm, dry basin, and quickly drawn up into the syringe and injected. Care should always be taken to keep the syringe warm (blood heat), and to inject the semen with as little delay as possible; but precautions should be adopted to avoid forcing air in along with the semen.

Signs of Pregnancy.

The usual period of pregnancy for a mare is eleven months, but this varies. Some mares foal at ten or ten and a half months regularly, while others go beyond their time by some three or four weeks. When foaling takes place in advance of the proper time the produce is generally weak and sickly; and if the mare carries the foal over her time the reverse is the case, the offspring being strong and healthy. A careful note in respect of whether a mare is early or late in foaling should be recorded by the stud groom, for future reference.

The first symptoms of pregnancy are the absence of the period of œstrum and refusal of the horse when tried. On the other hand, mares have been known to take the horse, and, nevertheless, to have been in foal; but such are exceptions to the recognised rule. The mare soon alters in her general temperament and behaviour, becoming dull and lazy, and puts up condition. After about three months the abdomen becomes pendulous, and a well-marked hollow is seen at the flank. Percussion gives positive evidence, and by pressing the hand several times against the abdomen on the near side, the fœtus can be felt responding to pressure. Another method is to give the mare a drink of cold water while fasting, this often causing a movement of the fœtus in the uterus.

Exploration per rectum or vagina may be resorted to, to confirm the diagnosis, but this should only be done in the very early stages, as it sometimes leads to abortion. It will be found that on weighing a mare, her weight has increased somewhat.

It is well to know the signs of approaching parturition: the abdomen drops, the hind quarters and flanks sink; the movements of the fœtus are seen to be more active; the vulva and surrounding tissues become swollen, and the mare is dull and sluggish; the udder becomes full and firm, and begins to secrete what is commonly known as wax, which usually drops out of the teats, and gives way to milk. The mare walks round her box, is continually gazing at her flanks, gets up and lies down with great care; then, ultimately, labour pains come on, and in the ordinary course of events the foal is born in fifteen

or thirty minutes. The fore feet, head, and shoulders appear first; finally, with a powerful, expulsive effort, the hindquarters are extruded.

Mares do better when left to foal alone, but a man must be in constant attendance should they require assistance. The foal being born, remove envelopes (if any) which cover the head, and free the mouth and nostrils, and, thus relieved, respiratory movement should begin gradually. The umbilical cord is generally ruptured during parturition; if it is not, the mare may attempt to break it with her teeth, if allowed to do so. It should be cut with a sharp scissors, and dressed as mentioned below. The produce should be taken to the mare's head, and if she be still in the recumbent position, she will commence to lick it. Some people sprinkle flour or salt over the foal to encourage the mare in the process. The licking not only dries the foal, but stimulates circulation in the skin.

The fœtal membranes are usually expelled in about half an hour or an hour after birth. It is advisable to inject the uterus with a disinfectant, such as chinosol, perchloride of mercury, lysol, &c. If the membranes do not come away within six to twelve hours they should be removed under strict antiseptic precautions, care being exercised that no undue force is exerted.

Treatment of Mares and Foals.

I must now say a few words *re* foaling mares and the dressing of the umbilical cord.

(1) All mares that are about to foal should have a dry, clean box, 20 ft. by 20 ft., with mangers, fittings, floor and walls that can be thoroughly disinfected, and also surface drainage. If necessary it should be possible to raise the temperature of the box by artificial means, and there should be sliding shutters arranged, so that the person in charge can see how the patient is progressing without causing disturbance.

(2) When the mare shows signs of being about to foal the vulva, anus, and perineum should be disinfected with a warm 2 per cent. solution of lysol in rain water. The vagina should be washed out by means of a syringe with a considerable quantity of the same strength of warm solution.

(3) The foal should be received upon a piece of clean cloth when possible, or at least upon a bed of fresh, sweet straw, unsoiled by urine or excrement.

(4) The cord should be tied immediately after birth with a ligature of eucalyptus or carbolised tape. The cord should then be cut 1 in. below the ligature.

(5) A portion of the cord still attached, as well as the umbilicus, should be dressed liberally with the following solution, and applied by means of a spray:—

Rain water	1 litre.
Iodine	2 grammes.
Potassium iodide	4 ,,

(6) Following this the umbilicus should be dressed with this solution:—

Methylated spirit	1 litre.
Iodine...	2 grammes.

(7) After the spirit has evaporated the parts may be painted with

a thick layer of collodion and iodine (1 per cent.) applied with a brush. This layer cannot be applied too thickly.

Profs. Nocard and Mettam, as a result of their researches in Ireland, have strongly advised this treatment in all cases for the prevention of umbilical infections.

I know a stud where navel ill was prevalent, and caused a considerable mortality yearly, but since the adoption of this dressing of the cord the farm is immune.

The foal, if weak, should be lifted on to its legs after a little while, and an endeavour made to teach it to suck. A small quantity of milk drawn into the hand when the nose is close to the udder will often induce the foal to do so, but it is always advisable to let the foal have the first milk, as it acts as a natural laxative. Young mares often have small teats, which makes it difficult for the foal to suckle, and others are so irritable or vicious that the foal cannot get near them. Such mares should be tied up or their leg held up until the foal has confidence, and the mare, becoming accustomed to the novel situation, allows herself to be sucked freely.

If the foal's bowels have not acted within the first hour or so it is well to remove the fæces (meconium) with the fingers, upon which have been smeared some vaseline, or to insert a glycerine suppository.

The treatment for a mare after foaling—supposing all to have gone on well—is to give the dam a nice warm bran mash, or if she be prostrated after the effects of foaling, gruel with an ounce or two of brandy.

Careful attention should be paid to the udder of the suckling mare, as it is liable to become hot, hard and painful, and should this condition arise it may be alleviated by slight fomentations, gentle friction, and frequent milking. If an excessive amount of milk, either from natural development or from the highly nitrogenous nature of their food, should issue from a mare, and if the foal should be allowed to indulge too freely in it, the latter is liable to digestive troubles. The mother should be milked twice or three times a day in such cases.

Supposing there to be a scanty supply of milk, scalded oats mixed with bran, to which a little treacle and salt have been added to make it more palatable, may be judiciously employed; and the udder should be gently massaged. When this fails to have the desired effect the foal ought to be put to another mare, if obtainable, or on another's milk, or fed out of a sucking bottle.

When foals are intended to be changed to different mares, they should be thoroughly rubbed with the mare's milk to whom they are going, for mothers recognise their produce by smell. Instead of rubbing with milk some people employ aniseed.

Feeding of Brood Mares.

The average breeding mare requires from 3 to 6 lb. of crushed oats and 12 lb. of hay per day, with a linseed mash twice a week. The aim of the owner should be to keep her strong and healthy, without allowing her to become gross or fat; consequently, this ration must be regulated according to the animal's constitution. Of course, this scale applies to autumn and winter feeding, as in the summer months, when there is an ample supply of nutritous grass available, it can be greatly reduced. When the foal is weaned the mare requires

no oats; for example, a mare foaling on the first of February would have the foal taken off her about the end of July or beginning of August, when she might be turned out and kept entirely on grass until the first of October, or even later if the weather remained mild. Then she should be brought in at night and gradually placed on a corn diet, and so become ready for her next foaling.

When a mare is within a few days of foaling it is advisable to limit her to half the usual quantity of hay, with a few small bran mashes in lieu of the usual amount of oats, the object being to prevent the stomach becoming distended with a large bulk of food. After the mare has foaled, chilled water should be given, and nice warm bran mashes, to which some people add ½ oz. of soda bicarbonate. Only a sparing supply of hay ought to be allowed during the first twenty-four hours, and one must depend mainly on the substitution of bran mashes, with a half supply of oats in them, for two or three days; gradually the corn supply may be increased to 9 lb., to stimulate the flow of milk to the foal. The amount of linseed will be regulated by the quantity of grass obtainable; when this is plentiful the bowels will be sufficiently relaxed without the addition of the former.

The Feeding of Foals: How to Care for them.

Foals soon commence to masticate, as may be observed by the little animal helping itself to the mother's oats, mash, &c. From the age of six weeks to two months the foal should have a small feed of crushed oats put in a low manger for itself, and the mare tied up so that she cannot reach it to steal the ration. This is to be increased very gradually until the foal is weaned, when it should be able to dispose of from 5 to 7 lb. of crushed oats per day, besides hay, linseed, bran, and mash.

It is advisable not to turn the mare and foal out until the latter is at least seven days old, but to have them led out for a half or three-quarters of an hour per day. Care should be taken that a sunny paddock on limestone land for preference, as it imparts to the young stock size and substance, with a southern aspect, and well sheltered from the cold east winds, be chosen. After the expiration of the first week, the prevailing state of the weather must, in all cases, be the guide as to the duration of the daily airing; if it be warm, they may with every safety be permitted to stay out of doors all day (*i.e.*, of course when the dew or frost has been dispelled in the morning and before it begins to fall in the evening); but on an inclement day the foal is better kept in the stable.

Wintering is often an anxious, but always an important, time in the life of young bloodstock. Only the very best of food should be provided; neglect of this results in debility and in the weakening of digestive organs; their necks become thin, and their muscles wasted; and, as any practical breeder knows, it is very difficult to get the youngsters into good health again as yearlings.

Foals displaying waywardness in their manners should be separated from the fillies as soon as possible, the same remark applying to yearlings. During the past three years I have castrated foals while running with the dam, from the age of four to five and a half months, with the best results. The plan adopted was to strap up the fore leg, put a side line under the near fore arm, and, with the assistance of two or three farm hands who are fearless, the foal may be lifted bodily and placed

on its side; strap up the other fore limb, and secure the hind limbs by means of a web. The patient being thus secured, apply a chloroform bag, caution being taken to allow a liberal supply of air, and the near hind leg can be released and drawn up until the toe is on a level with the shoulder of the corresponding fore limb. Being satisfied that the subject is properly anæsthetised, the operation may be proceeded with. The writer generally does so by torsion.

I have had no bad consequences from performing the operation at such an early stage; rather, I came to the conclusion that it had two decided advantages, viz.:—

(1) After they have been castrated, foals have nothing to impede their growth. It is most important they should not, especially if an owner be getting them ready, as yearlings, for the Doncaster, Newmarket, Dublin, or other important sales. Under ordinary circumstances, when a yearling is operated on he is thrown back a month or two, and, needless to say, this fact will be reflected in the price obtained if he be sent into the sale-ring.

(2) As yearlings they can occupy the same paddock as fillies.

Against these might be advanced the following disadvantages to pursuing the plan, viz:—

(1) A horse when castrated cannot be entered in the Derby or other classic race, so that his owner or buyer is prevented from attaining the greatest ambition everyone who engages on the Turf has. To combat this I would contend that a very good opinion could be formed from the breeding and its promise of improvement if it be worth while to undertake this obligation in its regard or not before castrating.

(2) I have heard the objection raised that such a proceeding will make foals effeminate as two-year-olds. My experience is opposed to this, and, I think, results on the racecourse will also confirm it.

Foals are usually weaned at six months, earlier if the mare's milk gets scanty; they fret and remain unsettled for some days while the mother is missed, and may even lose something in condition, but, generally after an interval of five or six days, soon forget their loneliness, and learn to forage on their own account.

The wintering and summering of yearlings is similar in treatment to that of foals, a variation, of course, being in the augmented amount of provender. They should receive 10 lb. of crushed oats, 14 lb. of good hay, and linseed and bran mashes twice a week. When the young grass comes in, oats can be reduced to 6 lb., and the linseed and bran dispensed with.

Yearlings may be left out all day if fine; if a penetrating wind be blowing, it is advisable to house them about mid-day; if cold rain be falling they should be kept in their boxes, or they might be turned out in a strawyard while their boxes are being cleaned out. In midsummer, if flies be troublesome, I should recommend that mares, foals, and yearlings be confined indoors all day, provided their quarters be well ventilated. In the evening they may be given their freedom, and left out for the night.

In conclusion, there are minor, but nevertheless important, matters in connection with young bloodstock that should be remembered, viz.:—

(1) Attention to their feet. The animals' hoofs should be regularly attended to by the smith, and, if growing out of shape or proportion, rasped in proper form, otherwise crooked legs, malformed fetlocks, and

other disfigurements may result, thus rendering the horse not liable to stand training and to make him unsound.

(2) The teeth are also often a source of trouble, and account for yearlings and two-year-olds doing badly; the teeth may be very sharp or not of equal growth, or the milk-teeth may not have been properly shed.

(3) Parasites (*Sclerostomum armatum, major* and *minor*, and *S. tetracanthum*) are the cause of annoyance, especially in marshy, low-lying districts. The addition of some rock salt in the manger is usually adopted as a precaution.

The attendant should put a soft web or leather head collar on the foal, when about two or three weeks old, for a short time; and should handle the body and limbs, lift the feet, and generally make his presence known, so that the young animal, being accustomed to these proceedings, will quietly submit when placed in the breaker's hands.

The growth of foals and their condition should be carefully noted, and diarrhœa and constipation guarded against, as either the one or the other is pernicious to the animal's wellbeing.

I have carefully avoided referring to the breeding of horses as advanced by the late Mr. C. Bruce Lowe in his "Figure System," as I scarcely think it comes within the scope of a veterinary surgeon. At the same time, it may be useful, and an acquaintance with the theory put forward would, no doubt, be an advantage to a member of the profession, for, rightly or wrongly, an already large and ever-growing *clientèle* manifests a wonderful interest in its results.

VETERINARY RESEARCH WORK IN INDIA—THE MUKTESAR LABORATORY.

In 1895 the population of Muktesar totalled only some forty souls, and at the present time there is a population of 1,200 to 1,300 persons. The buildings during the above-mentioned interval have already increased tenfold, and numerous buildings are now in course of construction, whilst others have been sanctioned. The area of the originally acquired estate—viz., 4 square miles—has been increased by 2½ square miles, and it is already becoming necessary to think of further extension. The number of animals, bovines, equines, &c., under daily observation in the headquarter sheds amounts to some 250, whilst reserve stock is maintained in farms and segregation kraals, situated at varying distances between the main buildings and the outer boundary of the estate. Communication is maintained between Muktesar and the plains by roads about 10 ft. wide, which have been wonderfully improved during the past five years. The want, however, of direct communication with the coast road (Kathgodam-Ranikhet) for the purpose of transport of grain, hay, apparatus and heavy weights of all kinds is a pressing one, and it is hoped that in the near future the difficulties in the way of carrying out such a project may be removed.

The settlement is supplied with water collected in a covered reservoir several hundred feet below the main buildings, from springs running directly out of the rock. From thence the water is pumped up by a 23 h.p. engine, and distributed by means of pipes to the buildings and sheds. The main laboratory and smaller ones are

supplied with gas manufactured from kerosine oil, and gasometers capable of holding over 2,000 cubic ft. are provided.

For some years all sera were prepared by the aid of centrifugal machines worked by manual labour, but as the production of sera increased it was found necessary to substitute mechanical for hand power. At present this work is accomplished by two oil engines of 12 and 9 h.p., in conjunction with two centrifugal machines of 10 and 5 litres capacity respectively. The engines also supply the necessary power for working an ice machine and lathe, the latter for the reduplication of certain portions of the machinery required without delay. In the near future it is hoped that electricity may be furnished to supply

FIG. 1.—Bird's-eye view of the Telegraph Office and Laboratory (elevation, 7,704 ft.).

the necessary power required for working some of the various farm implements, and so reduce to a minimum one source of continual trouble—namely, the use of unskilled coolie labour.

In addition to the main laboratory building, separate laboratories and stables for glanders and tetanus exist, whilst laboratories and cattle sheds are in course of erection for the preparation of hæmorrhagic septicæmia and *charbon symptomatique* serum and vaccines.

A meteorological observatory has been in existence for the past thirteen years, and a new one, only lately erected, has been instituted the headquarters for observations for the Eastern Himalayas. Daily records for the past twenty-four hours are telegraphed daily to the Director of Indian Observatories in Simla, to be included in the printed daily weather report.

In 1895 the establishment consisted of one assistant bacteriologist and of one native laboratory assistant, three clerks with a small number of menial servants; in 1906, two assistant bacteriologists, six laboratory assistants, six veterinary assistants, five clerks, three farm overseers and tamadar, with a large number of menial servants.

Muktesar is now more or less self-contained, for it possesses post and telegraph offices, dispensary, business shops, dahramsala, day school for some twenty to twenty-five native children, separate quarters for veterinary assistants under training, A.V.C. and C.V.D. officers' quarters (during annual courses).

It will be noted that this laboratory is now performing threefold

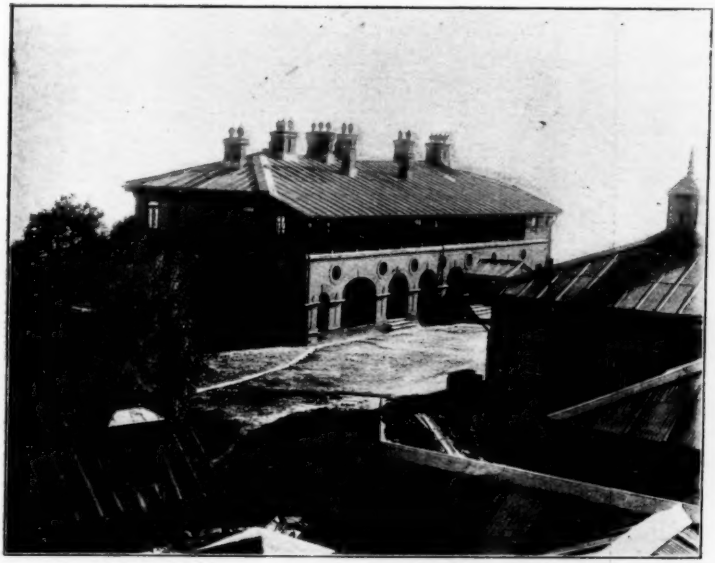


FIG. 2.—The Main Laboratory Building.

functions, viz., (1) preparation of sera, vaccines, and prophylactics; (2) research; (3) education; and it has established a claim for favourable consideration, inasmuch as, besides being useful in different spheres of work, in one department, viz., preparation of different sera, it pays more than its expenses.

In the last paragraph of this year's annual report for the Imperial Bacteriological Laboratory it has been reported that, "should the cost of all sera prepared be taken at 1s. per dose, as sanctioned by the Government to be charged to foreign countries (*i.e.*, two-third of the sale price in South Africa), then a clear saving of Rs. 1,71,658, deducting the total annual expenditure of the laboratory establishment and contingencies amounting to Rs. 1,04,500, would have accrued to the Government of India.

Clinical Articles.

SOME ACCIDENTS.

BY LIEUTENANT J. J. B. TAPLEY, A.V.C., STATION VETERINARY HOSPITAL, PRETORIA.

Two Cases of Luxation of the Flexor Pedis Perforatus Tendon.

The first of these cases was caused by the horse jumping short in the riding school and, on landing, hitting the point on the off hock

Luxation of the Flexor Pedis Perforatus Tendon.

on the top bar of a swinging gate. The internal ligamentous attachment to the *os calcis* was ruptured and the tendon dislocated outwardly. There was a large amount of inflammation in the neighbourhood of the point of the hock, the bursa of the injured tendon being particularly affected.

The history of the second case is that the horse fell when being ridden at a gallop on a level road, the surface of which was slippery. On rising from the ground the luxation of the tendon in an outward direction was noticed. There was practically no bruising or inflammation at the seat of the injury.

In both cases the tendon was displaced when weight was put on the injured limb, but when the hock-joint was flexed and the animal rested the leg with the heel off the ground, the tendon returned to its natural position. A photograph was taken of the second case to endeavour to show the position of the tendon.

The patients were placed in slings, and local applications applied in order to reduce the inflammation. As it was considered that neither of the patients would ever be again fit to perform military work, they were cast and sold some seven weeks after the accidents happened. When sold, both the animals walked only slightly lame, but when trotted the lameness was well marked.

Fracture of the Styloid Process of the Occipital Bone in a Mare.

The accident occurred at the veterinary hospital, where the mare was under treatment for a slight wound. She was suddenly startled and attempted to jump a 4 ft. 6 in. fence from a standing position. She hit the top rail with her fore feet, turned over and fell on to her forehead, rolling over to the off side. She lay unconscious for about three minutes, showing symptoms of dyspnœa before she died.

A *post-mortem* examination revealed the presence of fracture of the base of the right styloid process of the occipital bone; the muscles attached to the broken bone were lacerated, but there was no fracture of the bones forming the base of the skull, nor was there any hæmorrhage into the brain cavity.

Presumably the mare died from shock.

A Case of Amaurosis in the Horse Resulting from a Fall.

The horse in question, an officer's charger, was being led up the steep bank of the Rhenoster River during the manœuvres of this year, when he slipped, reared, and fell backwards, striking his poll heavily on the ground. On rising he appeared to be slightly dazed, and a little blood flowed from both ears. He appeared to recover almost at once, and the case was not reported until three days later, when I saw him and found he was suffering from total blindness, affecting both eyes. The pupils were fully dilated and did not respond to light; there was a slight increased tension of both eyeballs, and on ophthalmic examination a slight hæmorrhage was seen in the right eye near the disc. As no improvement took place after five weeks, the horse was destroyed by chloroform. An autopsy revealed the presence of a clot of blood on the right temporal lobe at the base of the brain.

Fracture of the Head and Internal Trochanter of the Femur in a Mule.

The mule was found at morning stables to be lying on the smooth concrete floor of the stall, and to be unable to rise. On being lifted up it was seen that the near hind leg was carried stiffly directed backwards, that the neighbourhood of the stifle was inflamed, and that the patella was luxated upwards over the internal lip of the trochlea of the femur. This dislocation was reduced and the animal placed in slings.

In three days, the swelling over the stifle joint having disappeared, the animal was taken out of slings and a further examination made. It was then seen that the mule was very lame and could bear no weight on the near hind leg, and the limb was adducted. The patient evinced great pain when the leg was forcibly abducted and when pressure was exerted on the inside of the femur, high up in the groin.

The animal was kept in slings for three weeks, when it was found no improvement had taken place, and the patient was destroyed.

The *post-mortem* examination showed that the left pubio-femoral ligament had been torn away from its attachment to the head of the femur, taking with it a portion of the articular surface, measuring 1½ by ¾ in. The internal trochanter of the left femur was also fractured, being broken into four small pieces, the largest of which was about the size of a shilling.

Apparently the patient must have slipped while standing in the stable, and the near hind limb was violently abducted as the mule fell to the ground. At the time the accident occurred the animal was probably sleeping.

FRACTURES OCCURRING IN TROOP HORSE AND MULE.

BY LIEUTENANT W. E. SCHOFIELD, A.V.C., PRETORIA, SOUTH AFRICA.

(1) Fracture of the Humerus in a Horse.

History.—The animal was being ridden at exercise at a trot; the word was given to pull up to a walk, and while in the act of doing this it suddenly stumbled on a small piece of rock. It almost immediately recovered itself, when it stumbled a second time very badly; it did not fall, but on recovering itself stood still, and it was then observed that no weight was being placed on the near fore-leg.

I was immediately sent for, and on arrival found most distinct crepitation in the region of the humerus, accompanied by loss of power in the limb.

I made a most careful examination of the exterior of the injured region to see if I could detect any sign of a previous injury, but there was none, not a hair being out of place, nor was there any wound or bruise visible.

The diagnosis being fractured humerus, the animal was immediately destroyed.

Post-mortem Appearances.—The left humerus was found to be broken clean in two, the fracture being diagonal, and extending from the

external tuberosity to the coronoid fossa. It is well seen in the accompanying photograph (fig. 1).

There was no indication of osteo-porosis. The bone was practically broken into two large pieces, there being only a few small chips from the edges of the main fracture.

Remarks.—Considering the facts, that the horse did not fall, and that there was no history or sign of previous injury, the question remains whether it is possible for violent muscular action, accentuated

FIG. 1.—Fracture of the Humerus.

FIG. 2.—Fracture of the Cuboid Bone.

by the fact that the animal was being ridden at the time, to cause the fracture of a healthy bone situated as the humerus is. The horse was 13 years old.

(2) A CASE OF FRACTURED CUBOID IN A MULE.

History.—This mule was the off-wheeler in a team harnessed to a heavy ammunition waggon. Whilst descending a steep donga, which had been half filled with loose boulders, the mule slipped and fell, and in doing so caught its near hind leg between the spokes of the wheel; the wheel did not run over the leg. As the mule, when outspanned, was found to be very lame, it was sent to hospital in a float. The next day the near hock was much swollen, and the animal would put no weight on the leg. It was placed in slings, but as no improvement occurred, and as, on manipulation, distinct crepitation could be

felt, the case was diagnosed as fracture of the tarsus, and the animal destroyed.

Post-mortem examination revealed acute arthritis of the whole of the hock-joint, while the cuboid was fractured into three pieces. The exact position and nature of the fracture is well shown by the accompanying photograph (fig. 1).

TWELVE CASES OF TUMOURS.

BY DR. S. J. J. HARGER, PROFESSOR OF ANATOMY, COLLEGE OF VETERINARY SCIENCE, UNIVERSITY OF PENNSYLVANIA.

THE following cases were abstracted from clinical and pathological records. While only a few have clinical value, they may be of interest in a comparative study of morbid growths. The previous and subsequent history of the patients and the results of operations could not in all cases be determined.

(1) FIBRO-SARCOMA.

Newfoundland Dog, aged 1: Had on the inferior aspect of the neck, and apparently involving the skin principally, a flat tumour 3 in. in diameter. Its surface was red, having the appearance of exuberant granulations and ulcerating. Had been growing for several weeks. After excision wound healed kindly. Microscopic diagnosis fibro-sarcoma, probably of inflammatory origin. Result as to recurrence unknown.

(2) CYSTIC ADENO-CARCINOMA.

Greyhound Bitch, aged 10: Second inguinal mammary gland as large as an egg, irregular and nodular on surface; had several cystic cavities filled with a bloody serum, one of which had ruptured and discharged a thin saneous fluid. Inguinal lymphatic glands enlarged. Growth dates back several months. Removed tumour and enlarged lymphatic glands. Diagnosis cystic adenoma, probably of duct origin. Operation June, 1905. No sign of recurrence *in loco* or metastasis, December, 1907.

(3) ADENO-CARCINOMA.

Black Bitch: Was operated on three years before for tumour of two mammary glands. At the end of three years all the mammæ on the left side, from the pubis to the sterum, and the spaces between them, were again occupied by a chain of hard nodular growths of various sizes—a pea to a walnut. The bitch died from operative hæmorrhage. The diagnosis was hard adeno-carcinoma of mammary origin.

(4) SQUAMOUS EPITHELIOMA.

Grey and White Cat: Tumour involving first pectoral mammary gland. Tumour was encapsulated by thin, fibrous tissue, spheroid in shape, 6 cm. by 3 cm., flesh-coloured, firm consistency, and slightly nodular on its free surface. Had been developing for some months. Was extirpated in June, 1905. Not known to what extent the mamma

was involved. The wound healed, and subsequently two tumours as large as a marble developed in the inside of the fore leg. The cat was chloroformed on account of a "severe cold."

(5) Epitheliomatous Change in Sebaceous Glands.

Black Cat: Flat tumour, the size of a silver dollar, on the left side of the neck; epidermis thick and scaly; derm and subcutis showing some inflammatory infiltration. In some acini no fatty cells could be detected, and their cavities were filled up with non-sebaceous epithelial cells packed in concentric layers, giving the growth an epitheliomatous type. The growth was the result of an irritant, probably of bacterial origin.

(6) Streptothrix Node.

Cat: Tumour on left side of the frenum of the tongue; hard, globular in form, as large as a hazel-nut. Was covered by the mucosa, and interfered with mastication. The microscope showed it to be composed of a loose, fibrous reticulum, enclosing in its areola numerous cells—eosinophiles, lymphocytes, and leucocytes. By Gram's staining there were found, especially in the deeper parts of the section, vast quantities of filamentous bodies terminating in bulbous extremities, and often branched. No definite radiate groups were found, but the appearance of these bodies was such as to leave little doubt of their character of a streptothric type. The nature of the growth (mostly eosinophile leucocytes) indicates a parasitic inflammation rather than a true tumour.

(7) Squamous Epithelioma.

Black Gelding: Showed enlargement on both sides of the face below the eyes; distressful sonorous breathing, profuse nasal discharge, &c., indicating obstruction of the nasal fossæ. Tracheotomy gave relief. Animal destroyed. The *post-mortem* revealed: Tumour as large as a child's head, probably originating in the hard palate, obstructing the nasal fossa and facial sinuses; surface of tumour red, lobulated, at certain points ulcerated; hard palate pushed into mouth and ulcerated. Section of tumour was greyish in colour, and lobulated in appearance. The "pearly bodies" were large and characteristic. So much of the walls of the nasal and buccal cavities was involved that operation was beyond question.

(8) Soft Fibroma.

Black Gelding: The clinical symptoms were very similar to, but not as aggravated as, those of case 7. A large tumour obstructed the left nasal fossa and facial sinuses. It was rather firm, smooth on its surface, and reddish-grey on section. The microscope revealed a soft fibroma.

(9) Melanotic Spindle-cell Sarcoma.

Grey Gelding, aged 8: Oval tumour, 6 in. in diameter, 5 in. from the end of the tail; surface red, fungoid, and bled readily when touched; numerous metastatic nodules on the tail and anus, of the usual appearance of caudal melanosis. The picture of spindle-celled melano-sarcoma showed in some parts myxomatous change. The tumour was

excised and the cavity allowed to granulate. Operation, June, 1905. Operation very successful, but other tumours developed close to the rectum, and the horse had to be destroyed some time afterwards.

(10) Mixed Osteosarcoma.

Black Gelding, aged 15: Large, hard, bone-like, encapsulated, subcutaneous tumour in the external scapular region behind the acromion spine; close by a small tumour as large as a robin's egg. These tumours had no connection with any osseous skeletal structure. Seven years ago a similar growth was removed from the same location. The outer dense wall of the above tumour shows definite osseous structure, with numerous and irregular Haversian canals and concentric lamellæ with lacunar spaces containing bone, corpuscles, and canaliculi. On the surface is a thick layer of dense fibrous tissue, with cellular layer next the bone proper, after the type of an ordinary periosteum. In the interior of the tumour were areas of myxoma, of large round and large spindle-cell sarcoma and of chondroma.

(11) Soft Fibroma.

Grey Mule: On the outside of the left forearm were four fungoid tumours as large as a hen's egg, slightly pediculated, ulcerated, red, and bleeding readily. On the outside of the cannon was a large cutaneous patch, covered with numerous small growths of the same kind. The former were removed with the bistoury, and the latter cauterised with the hot iron.

(12) Adeno-carcinoma of the Cerebral Choroid Plexus (Dumminess).

Black Gelding: The horse showed all the typical symptoms of dumminess, or immobility, also called *hydrops ventriculi* in the horse, excepting that the horse would back freely, but could not be made to walk.

Post mortem.—The left lateral ventricle was distended with about an ounce of serous fluid, and contained, in place of the plexus itself, a dark-brown, soft, oval, cauliflower mass, $1\frac{1}{2}$ by $\frac{3}{4}$ in. The cerebral cortex was compressed and thinner than normal. The structure of the tumour was that of an adeno-carcinoma, with some of the acini undergoing hyaline degeneration.

A CASE OF STRANGULATED UMBILICAL HERNIA.

BY C. W. TOWNSEND, M.R.C.V.S., LONG STANTON.

The subject of the above heading was a bay pedigree Shire colt, aged 1 year 9 months, which I had previously operated upon twice for a large umbilical hernia, once by the method which I usually adopt for such cases, viz., transfixing the hernial sac with a tight ligature after first penetrating the sac as high up as possible with a needle, and cutting off the protruding ends, this latter process enabling one to get a much better hold of the sac, and at the same time preventing the ligature from slipping off.

The above method not meeting with the desired result, I tried the

method of closing the hernia by applying a wooden clamp to the hernial sac. Although the above methods considerably reduced the size of the hernia, yet the umbilical opening still persisted. I had therefore decided to attempt to eradicate the hernia by suturing the hernial ring (a method which I have occasionally applied with success after the other ordinary methods have failed), and had the colt already at my infirmary for this purpose; but much to my surprise, one evening about 9 o'clock, the animal was found to be in great pain, groaning continually, lying down and getting up, walking round the stable, &c. The position which seemed to give most relief was the one of lying on its back for considerable periods. Examination of the umbilicus easily accounted for the above symptoms, for the hernial sac had now become greatly swollen, very hard, and painful to the touch, the hardness being extreme. Concluding that I had a case of strangulation of the intestine to deal with, I at once proceeded to prepare myself for the operation (knowing that this condition could not have existed for any length of time, the colt having been apparently in good health at 7 o'clock the same evening). I accordingly had the animal cast with side lines, chloroformed, and placed on his back, being retained in this position by bags of chaff placed on each side. After disinfecting the area of operation, &c., I now first attempted to reduce the strangulated intestine by taxis per rectum, at the same time gently manipulating the hernia at the umbilicus. (Taxis per rectum for this kind of hernia may to some appear difficult, but I may say that when once the animal is well under the influence of an anæsthetic, the umbilicus is easily reached with the hand, owing, no doubt, to the muscular coats of the bowel becoming considerably relaxed, thus enabling one to get one's hand well into the small colon, which at other times cannot well be done without a good deal of risk to the animal). This, however, proved to be quite impossible, owing, no doubt, partly to the strangulated portion of intestine having become considerably swollen from interference with the circulation of vessels in the intestinal walls, but also to the arrest and subsequent fermentation of fæces in the strangulated part; although, after I had incised the hernial sac, manipulation of the intestine revealed very little fæces in the strangulated part. I now was obliged to incise the hernial sac, which I did laterally, with an elliptical incision of about 2 in. in length. This having been done, I inserted my fingers through the opening and exerted slight pressure on the intestine, my assistant at the same time again exerting slight taxis per rectum. This method also being useless, I now performed enterocentesis, thinking this would allow of the escape of the imprisoned gas in the strangulated intestine, but with no better result. I was therefore compelled, as a last resort, to perform herniotomy, and enlarge the hernial ring, a process which had to be done very carefully, owing to pressure of the bowel on the hernial sac, which left very little room for introducing a herniotome; however, by introducing the herniotome between the fingers of the left hand and opening it with the right, I considerably reduced the risk of cutting the intestine. As soon as the hernial ring had been enlarged, the strangulated intestine was returned into the abdomen. I now sutured the incision in the hernial sac, and finally, to prevent recurrent descent into the bowel, I applied to the hernial sac a tightly fitting clamp. My after treatment consisted in giving the animal good but easily digested food, supported

by nutrient enemas; but in spite of much attention, he succumbed on the fifth day after the operation.

Post-mortem examination revealed that the cause of death was septic peritonitis, with slight inflammation of small intestine, the latter being most marked for a length of about 2 ft., and about midway between the duodenum and the large colon, this, no doubt, being the strangulated part; there was also a good deal of inflammatory swelling in the umbilical region, no doubt due to the application of the clamp.

Remarks.—Although I operate on a considerable number of cases of umbilical hernia every year—and seldom do I meet with one that requires operating upon twice—yet never has it fallen to my lot to meet with a case of strangulation of this kind of hernia before, and I have good reasons for thinking that such cases are seldom met with; indeed, I believe it is commonly thought that umbilical hernias are not very dangerous. No doubt the reason why my operations by ligature and clamp in the first instance were not successful was simply because there already existed an adhesion between the bowel and the hernial sac, and that although the inflammatory swelling produced by these operations considerably reduced the size of the ring, yet complete occlusion of the ring was impossible unless the adhesion had first been broken down.

A PECULIAR CASE OF LAMENESS.

BY LIEUTENANT H. T. RYAN, A.V.C., QUETTA, BALUCHISTAN.

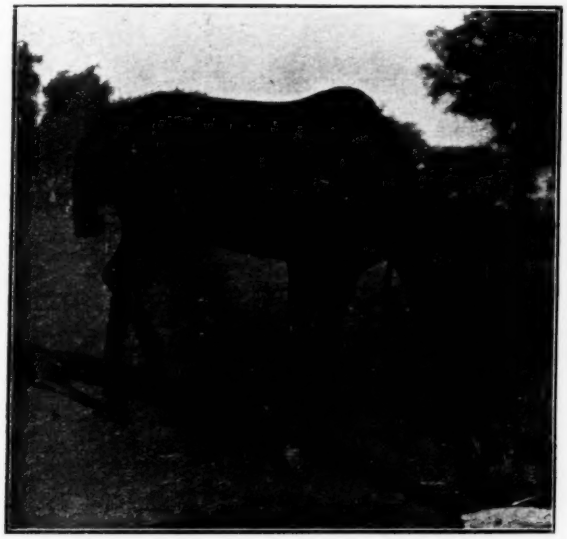
In November, 1906, I was requested by the officer commanding a native cavalry regiment to look at a lame horse which, according to the salutri, was suffering from sciatica of the off hind leg. Subject was a roan cob, aged 14, about 15 hands, which had always been used for riding purposes till about two months previously, when the lameness complained of was noticed. At first it used to pass off with exercise, but after about a fortnight he got so bad that even walking as far as the water-trough had to be discontinued.

The salutri's chief reason for diagnosing the case as being one of sciatica was because he noticed the horse held his leg in the air most of the night and earlier part of the day until the atmosphere got warm. Formerly the animal used to put a certain amount of weight on the leg during the warm part of the day, but latterly kept it in the position shown in the photograph both day and night.

On my examining the animal, I found him to be in bad condition, due principally to the pain he was suffering. The muscles of the off hip were atrophied, and, on carefully examining the foot, I could not find anything wrong. I next examined the whole limb very carefully, flexed all the joints, but absolutely failed to detect any heat or pain on pressure of any particular spot, nor could I detect stiffness of any particular joint; but when walked the animal still persisted in keeping the affected leg in the air, and was evidently suffering severe pain. From the position in which the leg was carried, and the absence of any other symptoms, I strongly suspected disease of the stifle-joint, as I had a case showing almost the same symptoms about three years

previously, which, on *post-mortem* examination, proved to be dry arthritis of the stifle-joint.

I particularly examined the stifle-joint in this case, but, like the previous one, there was absolutely nothing abnormal with it, and as I could not say definitely where the disease existed, and not wishing to make his superiors lose faith in him, I agreed with the salutri, and said I would treat the animal for sciatica, and suggested that he be put in slings, and that the whole leg, from the foot to the hip, be kept warm by means of padding with tow, kept in position by suitably-



Photograph showing the way in which the leg was held when the horse was standing.

made "breeches," and suitable medicine given. Ten days later I saw the animal again, and there was no improvement whatever; in fact, I thought he was, if anything, worse, and the wasting of the hip muscles was more marked.

I again made a thorough examination of the whole limb, beginning at the foot, and I again failed to find anything abnormal, and was more convinced than ever that my surmise of disease of the stifle-joint was correct, although the only ground I had to suspect such a thing was my experience in the former case; but however strongly one might suspect a thing, a solitary case is hardly good enough to "stake" one's opinion on. I advised that the treatment be continued for another two or three weeks, and then, if there was no improvement, that the animal be destroyed.

About a fortnight later, Colonel Nunn, the Principal Veterinary Officer in India, was going round the lines, and as the case was to me

an interesting one, I brought it to his notice. He thoroughly, and in a very practical manner, examined the animal; he could not find any fracture of the pelvis, or anything, on manipulating the whole limb, which would lead one to suspect any particular joint or place being the seat of trouble. He agreed with me that it would be quite wrong to say that the salutri's diagnosis of "sciatica" was not correct, but that he thought my diagnosis of there being some arthritis of the stifle-joint was nearer the mark. As the animal was fairly old, had been under treatment some time, and was not making any improvement, we agreed that it would be best to destroy him, and this was done immediately.

Post-mortem examination revealed that the synovia in both the femoro-patellar and the femoro-tibial joints was darker, of a thicker consistency than normal, and blood-stained. The synovial membranes were roughened, and showed a white rheumatoid deposit in spots here and there round the joints, particularly at the edges. The semilunar cartilages were worn away, and were only half the thickness of those in the other sound stifle-joint. Entirely separate from this lesion there was a sac containing about 3 oz. of inspissated sanguineous pus in the space between the tibia and fibula. The sciatic nerve was dissected away in a few places along its course, and found to be normal.

Now to my mind this case is interesting in so far as the stifle-joint, which on *post-mortem* examination proved to be in a diseased condition, should have shown no abnormality on external manipulation; also that an abscess containing about 3 oz. of fluid could be practically underneath the skin, and yet, when pressure was brought to bear on it, the animal did not flinch or show signs of pain.

RUPTURE OF THE STOMACH AND INTUSSUSCEPTION OF THE SMALL BOWEL.

BY W. CLUBB, V.S., EAST RUDHAM.

THE patient, a well-bred hackney mare, 8 or 9 years old, was found by the owner, late one night, to be in great pain and unable to rise. She had no premonitory symptoms, and had appeared in perfect health up to this time. A colic draught was administered, but death took place quite suddenly a few hours later.

Post-mortem examination revealed a large rupture in the wall of the stomach, and an intussusception of the small bowel fully a yard in length. The stomach was quite empty, the contents having escaped into the abdominal cavity.

The case seemed to me of sufficient interest to place on record, as intussusception of the bowel is not commonly met with in the horse, and it is rarer still to find it accompanied by a ruptured stomach. Another point of interest is to surmise which was the primary lesion, as the mare appeared in excellent health until the sudden seizure.

AN INTERESTING INTERNAL TUMOUR IN A PONY.

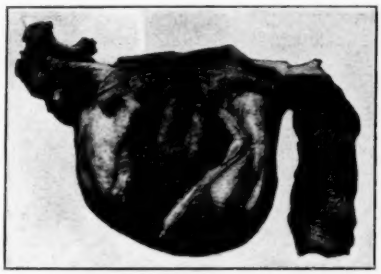
BY REGINALD OVER, M.R.C.V.S., RUGBY.

THE subject was a polo pony mare, aged 6, unthrifty in condition, and with a small swelling in the off flank. When first seen on February 14, 1907, the swelling looked suspicious of hernia, but on examination I could find no opening in the abdominal wall.

On May 3 I saw the case again and the swelling had nearly all disappeared, but the pony was still losing condition and getting perceptibly weak.

On May 18 I consulted Professor Hobday, who diagnosed it as internal tumour, but as a precaution we tested it with tuberculin; there was no reaction.

On June 5 the tumour could be detected per rectum as large as a man's head, and I advised slaughter, but the owner was very anxious for an operation to be performed, so the animal was cast and



Internal growth from the abdomen of a polo pony.

chloroformed and the tumour was tapped by means of a long curved aspirator needle fixed to a length of rubber tubing, to which was attached at the other end an indiarubber enema syringe. The operation being performed as follows:—

The arm was passed into the rectum and along the bowel as far as possible, the point of the needle, protected by a cork, being carried in the hand, and at the most convenient place the cork was pushed off with the fingers and the needle pushed through the bowel wall into the tumour. The syringe was used next as a suction pump and about a pint of fœtid brown watery fluid was drawn off. As further efforts failed to draw off any more fluid the needle was withdrawn and found to be blocked. It was cleared and re-inserted, a further pint of fluid being abstacted and the needle again becoming blocked.

Seeing the absolute hopelessness of the case, I then persuaded the owner to allow me to destroy the animal.

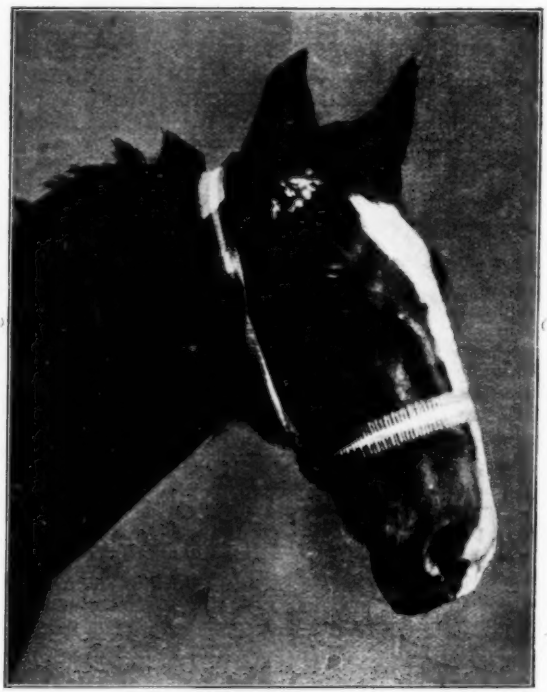
The *post-mortem* examination revealed a large tumour suspended from the roof of the abdomen and attached also to the abdominal wall on the off-side, the position in which the swelling had at first been visible. The weight of the tumour and its contents was about 39 lb.,

and when empty 24 lb. It resembled a stomach in appearance, with walls varying from 1½ to 2 in. in thickness, and was filled with a stinking coffee-coloured fluid containing small quantities of the finer pieces of ingesta. There was a mouth with puckerings of the lining, not unlike those of the œsophagus where it enters the stomach, communicating directly with the small intestine close to the cæcum. It measured 2 ft. 1 in. in length by 20 in. from the top to the base.

A DENTIGEROUS CYST.

BY REGINALD OVER, M.R.C.V.S., RUGBY.

THE subject of this abnormality was a very good yearling shire colt. The owner wished to have him castrated because he had an enlargement under the right ear, with a sinus discharging a milky-



A Dentigerous Cyst.

coloured, viscid material, which had been noticed a few months and was gradually increasing in size. I diagonised it as a dental cyst, and persuaded the owner to leave the animal "entire," and to have the

cyst operated on. The colt was accordingly cast and chloroformed, and a big incision made over the tumour; the skin was well dissected back and with a small saw the bony cyst was removed containing two molar teeth. The edges of the wound were brought together and the colt made an uninterrupted recovery.

The accompanying photograph was taken a few days after the operation, and while there was still a little swelling. This gradually disappeared and only a small scar was left, which was practically invisible unless specially looked for.

The colt was afterwards sold at a high price to be sent abroad.

Abstracts and Reports.

WIRE-WORM (*STRONGYLUS CONTORTUS*)—THE STOMACH WORM OF SHEEP AND GOATS.[1]

BY R. W. DIXON, M.R.C.V.S.

THIS parasite, which is so prevalent amongst sheep and goats in this Colony, has, this last summer, caused great mortality amongst sheep in the Eastern Province. Consequently, I have thought that it might serve some useful purpose to the stock farmers of this country if a short, concise article dealing with the symptoms, life history, and treatment for this pest be published. I do not pretend to advance anything new regarding the treatment for stomach worms, but I shall endeavour to explain the treatment which has been found most effective in this Colony, also other remedies which have been used in other countries with more or less success. In a circular issued by the Bureau of Animal Industry (United States of America), appears an excellent article on "Stomach Worms in Sheep," written by B. H. Ransom, Chief of the Division of Zoology, and in that article is given a very interesting life history of the stomach worm, which I shall take the liberty to quote extensively.

The wire-worm infests the fourth stomach of sheep and goats principally, but may be found also in cattle and various wild ruminants, and, amongst small stock, causes at times more losses than any other of the internal parasites of farm animals. More especially lambs and young sheep are seriously affected, but often fully-grown sheep, although badly infested, providing the veld is in good order, may show no apparent symptoms of disease.

Symptoms.—The general symptom is a pernicious anæmia shown by loss of flesh, weakness, debility, thirst, and diarrhœa. The mucous membranes of the eyes and mouth are pale and bloodless, and in the advanced stages a dropsical effusion appears under the skin of the lower jaw.

A *post-mortem* examination will reveal the presence of the parasites wriggling about in the fluid contents of the fourth stomach, about 1½ to 1¾ in. long, and about as thick as an ordinary pin.

Its distinguishing name, *Contortus*, is given to it because it has a

[1] Abstract from the *Agricultural Journal* of the Cape of Good Hope.

red and white spiral appearance, like a barber's pole. "This arises from the arrangement of its ovarian tubes, which are rolled around the intestine to form regular loops, the intestine being straight and of a red colour. It subsists on the blood it abstracts from the mucous membrane, and to this it owes its brown colour."—(Neuman.)

Life-history of the Wire-worm.

"According to the investigations of C. Baillet, the *Strongylus contortus* is ovo-viviparous (that is, the eggs contain living embryos before being discharged from the parent worm), and these embryos, which they produce, will not develop in pure water, but die in the course of a few weeks."

"Leuckart reports that he has seen them growing rapidly in muddy water, however, and after several moultings reach a state of development in which they were capable of being completely perfected in ruminants."

From investigations carried out by the officials of the United States Bureau of Animal Industry, it appears that the worms in the stomach produce eggs of microscopic size, which pass out of the body of their host in the droppings, and are thus scattered broadcast over the pasture.

The eggs require a temperature above 40° F. to hatch out, taking from a few hours to two weeks, according as the temperature is high or low; when the temperature is below 40° F. the eggs remain dormant, and in this condition retain their vitality for two to three months. Freezing or drying soon kills the unhatched eggs. The tiny worm which hatches from the egg, feeds upon organic matter in the droppings, and grows until it is nearly $\frac{1}{30}$ in. in length; further development then ceases until the worm is swallowed by a sheep or other ruminant, after which it again begins to grow, and reaches maturity in the fourth stomach of its host in from two to three weeks. The fact that they crawl up blades of grass whenever sufficient moisture exists, such as dew, rain, or fog, increases the chances of these young worms being swallowed.

The young worms which have reached the stage when ready to be taken in the body, are greatly resistant to cold and dryness, and they will stand repeated freezing, and have been kept in a dried condition for thirty-five days, afterwards reviving when moisture was added. It has been proved that pasture on which no sheep, goats, or cattle have been allowed to graze for a year will be practically free from infection.

The time required for clean pasture to become infectious after infected sheep or goats are placed upon it, depends upon the temperature assisting the eggs of the parasite contained in the droppings to hatch out, and the young worms to develop to the final larval stage, when, if swallowed, they continue their development. This final larval stage is reached after the eggs have passed from their host from three to four days to three to four weeks, according to the temperature.

Another interesting fact is that the eggs, or newly-hatched worms, if swallowed, are not capable of development. It will thus be seen that although sheep and goats may become infected by drinking water contaminated by the droppings of animals infested by wire-worm, the principle medium of infection, given favourable conditions, is through

the pasture, and this explains why wire-worm is so much more prevalent amongst our small stock in the grass veld when we have rainy seasons.

In America, methods have been adopted with more or less success to prevent infection of the lambs, and also cleaning the pasturage, but I fear in this country, taking into consideration our climatic and stock farming conditions, these methods would not be of much practical value.

Treatment.

The late Chief Veterinary Surgeon of the Cape Colony, Dr. Hutcheon, carried out a large number of experiments with different drugs in order to obtain some effective remedy for the destruction of this stomach worm, and found that a solution of bluestone (sulphate of copper) gave the most satisfactory results. I also have had good results when dosing small stock affected with wire-worm with bluestone solution, and the following is the strength of solution I recommend:—

For lambs and kids I find it is safer to give a weaker solution than that administered to grown-up animals.

For Lambs.—Take 1 lb. pure bluestone (avoirdupois), 1 lb. Colman's mustard (fresh), 12 gallons of rain water. Dose: Lambs, 3 to 6 months' old, give 2 oz.; 6 to 9 months' old, 3 oz.; 9 to 12 months' old, 3½ to 4 oz.

For Sheep and Goats.—Take 1 lb. bluestone (avoirdupois), 1 lb. Colman's mustard (fresh), 10 gallons of rain water. Dose: 12 to 18 months, give 4 oz.; 18 months and over, 5 oz.

The bluestone should be clear blue crystals, with no white patches or crusts, and should not be dissolved in an iron or galvanised iron vessel. An enamelled bucket, such as is used for milking purposes, answers admirably, and rain water, if procurable, should be used for making the solution.

Fast the flock from twenty to twenty-four hours before dosing, and keep them away from water the day they are dosed. It is important that the bluestone and water be accurately weighed and measured, and that a measure glass be used to measure the graduated doses. In dosing both sheep and goats, I prefer doing them standing on all four legs. It has been found by experiment that if the dose is taken quietly, most of it will pass directly to the fourth stomach when the animal is dosed in the standing position, and when the animal is placed on its haunches only a part of the dose passes immediately to the fourth stomach.

Many sheep and goats are killed by careless dosing, therefore, when the animal bleats or coughs, more especially goats, stop pouring and lower the head at once, otherwise the fluid will enter the larynx and descend to the lungs. Many farmers on the border recommend dosing with dry powdered bluestone, and have informed me that the results obtained by this method have been most satisfactory.

A dose of 10 to 15 grains, according to the size of the sheep, is given dry on the tongue after fasting the flock for twelve hours, and taking the precaution to keep the flock from water during the day they are dosed. Small spoons are made especially to hold the different doses required.

In America, good results have been obtained from a single dose of a 1 per cent. solution of coal tar creosote. This solution is made by shaking together 1 oz. of coal tar creosote and 99 oz. (practically 5 pints) water. The doses of this 1 per cent. mixture are as follows: Lambs, 4 to 12 months' old, get 2 to 4 oz.; 12 months and upwards, 3 to 5 oz. In many parts of the United States it has been found that the substance known as coal tar creosote varies considerably in composition, consequently complaints have been made that the drug dispensed by some chemists as coal tar creosote has failed to give satisfactory results.

Gasoline is also used extensively as a remedy for stomach worms in America, but it has its drawbacks, for it has to be administered three successive days as follows: The evening before the first treatment is to be given the animals are shut up without food or water, and are dosed about ten o'clock the next morning. Three hours later they are allowed food and water, and at night they are again shut up without food or water. The next morning the second dose is given, and the third morning the third dose, the treatment before and after dosing being the same in each case. The sizes of the doses are as follows: Lambs, ½ oz.; sheep, ¼ oz. To be given in some oleaginous fluid, such as linseed oil or milk. Gasoline should not be given in water.

Preventive Remedies.

As a preventive, a lick, composed as follows, has been found very effecive for wire-worm and all kinds of worms: Powdered sulphate of iron, 1 part; flowers of sulphur, 1 part; slaked lime, 1 part; common salt, 5 parts. Mix carefully and thoroughly. Another is: Cooper's Dip, 1 part; flowers of sulphur, 3 parts; powdered slaked lime, 3 parts; common salt, 30 parts.

This lick can be safely given daily for a week, and continued every alternate week during the summer and autumn, when all such worms breed out most rapidly.

Reviews.

The Twentieth Century Book on the Horse. By Sidney Galvayne. Pp. 346, fully illustrated. Published by Baillière, Tindall and Cox. Price 21s.

Under the above title, we have a most comprehensive and interesting work on the horse, admirably illustrated, and written with a simplicity which will render it perfectly intelligible to the most illiterate person who is likely to endeavour to glean some information from it. Including as it does the wide range of subjects dealing with matters equine under its perhaps too far-reaching title, the work is pre-eminently of value to horsemen of all degrees, because it embodies a lucid and exhaustive description of the author's system of horse taming and training—a system which has brought the originator world-wide fame as a horseman, and with which his name is inseparably associated.

After reading through the lengthy descriptions of the Galvayne

system, we find that the essence of his method is the use of intelligent and humane means to effect that which is so often attempted by the most disgustingly brutal and cruel means, resulting in the merely nervous horse being rendered oftentimes vicious, and the colt who is inclined to be vicious being confirmed in his vice. The basis of the methods described in the work under review depends on the fact that the horse is to be regarded as an animal possessed of certain senses, intelligence, and memory, and by appealing to these the author has brought about results to which no other man can lay legitimate claim. Especially is this strikingly demonstrated by the fact that of the thousands of horses which passed through Mr. Galvayne's hands when he was Director of Breaking to the Imperial Army during the South African war (horses from all countries and afflicted with every conceivable vice), the number finally rejected as unfit for service was insignificant.

The first chapter of the work deals with the management of the colt, from which we are led on to a full description of the methods embodied in the system and the implements employed. The crystallised wisdom which is presented for our consideration reveals a truly wonderful insight into the psychology of the horse.

Bitting, mouthing, and bending are next dealt with, and in natural sequence training to harness and shafts, teaching the colt his paces and how to jump, followed by some excellent advice on accustoming a colt or horse to the proximity of steam and motor-cars, a most weighty present-day problem.

Leaving the subject of breaking, the author next launches into matters involving horses at a later period in their life, giving us first a most interesting and practically useful account of his methods for preventing and curing all the known vices. The next chapter is one which should commend itself particularly to veterinary surgeons, dealing as it does with throwing, and here, after reference to the old methods of casting, in which there are painfully obvious faults, the author demonstrates the superiority of the method in which intelligence and an intimate knowledge of the horse takes the place of much of the brute force which is expended by the large number of assistants required in throwing with hobbles, and enables one man with a rope to cast and fix a horse (irrespective of his weight and strength) by causing the animal to use its own strength against itself. The same principle can be traced in the application of the author's humane gag and twitch, and in his methods of picketing, hobbling, knee-haltering, &c. A few notes on colour and conformation have their place, followed by a chapter on examining horses as to soundness.

Although the practical value of the work depends entirely on that portion in which the author's peculiar methods are described, we would draw the reader's particular attention to the chapter headed "Dentition." In these we read clearly and concisely the indications by means of which a horse's age may be determined from birth to old age. We have the privilege of studying the significance of the "Galvayne" groove (which is now generally accepted as being an important indication of age above 10 years), as described by the man who actually made the discovery, giving the groove his own name.

The last 100 pages deal with very different matters to the former part. First in order, we read some general hints on barren mares and

mares foaling, the advice given bearing, as elsewhere throughout the book, the hall-mark of practical experience. Following these are a series of subjects to which justice cannot possibly be done in a work of this size. We refer to the chapters headed "Stables," "Feeding," "Shoeing," "Castration." The first three are passed over with a few commonplace remarks. The last-mentioned is a subject which concerns only the professional man, and contains no information that may not be obtained, much more fully, from any of the recognised text-books on the subject.

The same remarks apply to the notes on diseases and their treatment, in which there occurs little that is original.

The concluding chapter is a treatise on training polo ponies and playing polo, contributed by the author's son, Mr. Fred. Galvayne, who, as manager of the Société du Polo, Paris, may be considered as qualified to speak on the subject, and his remarks will prove of interest and practical utility to all those who are interested in the game of polo.

In conclusion, we commend this up-to-date volume to the horse-owner, the horse-breaker, the student, and all who are interested in the friend and companion of man, being convinced that if such give it their intelligent and unbiassed consideration, they cannot fail to learn something which will be of value to them and of benefit to the equines with whom they have to deal.

The success of the work to date has been so remarkable that this, the second edition, is demanded within twelve months of the original publication. The publishers have done their work well, the paper, binding, and illustrations leaving nothing to be desired.

E. B.

THE PSYCHOLOGY AND TRAINING OF THE HORSE. By Count Eugenio Martinengo Cesaresco. Pp. 334. Published by Mr. T. Fisher Unwin. 10s. 6d. net.

THE title of the work under notice would lead one to expect a book of considerable intellectual depth, besides being of practical value, and so it is disappointing to find that the sum and substance of the contents of the book amount to the theorisation of what one instinctively understands and practises towards animals of whatever species.

In the opening chapter, dealing with the mind of the horse, the author speaks of the mental qualities, intelligence, imagination, which latter, he informs us, is highly developed, and memory, which we infer from his remarks, and more certainly from actual experience, is of a mechanical nature, depending on the impressions he receives under certain circumstances; thus on p. 4 we read the following paragraph: "The horse is usually observant and attentive to everything, and remembers things well. He is particularly mindful of good treatment and bad, and of all persons and objects which gave him pleasureable or disagreeable sensations or sensations of fear. Also of the places where he experienced these feelings and which were associated with them."

We cannot agree with the author in a statement he makes lower on the same page, in which he attributes to the horse the entirely human attribute of hope, saying that the sight of a person by whom he was well treated before makes him hope on seeing the person again that he will be again well treated, for hope implies doubt, and the

horse in this instance can have no doubt because his memory only includes an experience of good treatment.

The author next describes "the excitability to motion peculiar to the horse," and then senses, sensitiveness, and sensations, followed by notes on instincts, inclinations, and feeling, in connection with which Count Cesaresco points out that the only idea which fills the mind of the wild horse regarding man is that of fear, "knowing," he adds, that he (man) is an evil creature," the moral of this statement we do not for a moment dispute.

The pages which follow these are in the main a repetition of those earlier in the book under different headings and expressed somewhat differently, the chief aim of the author being evidently to impress his readers with the fact that the training of the horse is based on the universal law of cause and effect, every action of the trainer, every sound he utters, and each mode of treatment to which he subjects the horse, producing in the object of his attention a certain effect, and so, if he understands what he is about, he will be careful to do only those things which will produce the desired results. The horse, we are told over and over again, must never on any single occasion be allowed to have his own way, or he will, when that occasion arises, again expect to do as he wishes even in opposition to his trainer. Other points dealt with in this first part of the book are individual qualities, character, and idiosyncrasies, and the necessity of suiting our treatment to what we observe to be his character, temperament, and abilities.

Two long chapters are headed respectively "How the Horse Learns," and "How he must be Taught Obedience," and embody practically the same advice as that offered in the earlier pages, all of which advice will probably be accepted by the reader as certainly true, but as not making any great addition to our knowledge on the subject.

Perhaps the most interesting part of the work is that in which the author refers to the training of circus horses, and exposes the harmless deceptions practised by the circus-master to hoodwink the public, and it is in describing the methods by which a horse is trained for the circus that the author shows to advantage his knowledge of the subject, the whole trend of his book being in this direction.

Count Cesaresco very aptly likens the trained horse to a machine, in which one has only to touch a certain key to get the corresponding movement.

A rather sentimental note is struck on p. 194, where the author, speaking of obedience, impresses on us the superiority of moral persuasion, which he calls "the ascendancy of love," over the use of brute force; the method of expressing this most excellent principle strikes one as being rather peculiar as applied to the horse.

E.B.

Translations.

THE PHYSICAL AND CHEMICAL EXAMINATION OF MILK.

BY PROFESSOR ADAM.

THE author makes the following remarks at the conclusion of his paper: "As has been shown, it is quite possible to detect if milk is skimmed, separated, or had foreign matters added to it, but the process is slow and difficult, the apparatus required being complicated and expensive, even for physico-chemical examination; but this is not sufficient, as sterile milk may be harmful if it contains toxins, so that the testing is one of great complexity.

"It is, therefore, much more simple to adopt preventive than curative measures in the form of sterilisation, which not only alters the milk, but is not a complete guarantee.

"It is the source of supply that should be attended to; the cows should be healthy, and any fraud or adulteration rendered impossible between the farm and consumer, and the means by which this can be done are most admirably described by Dr. Henri de Rothschild in his work, 'Le Lait à Copenhagen.'

"In other words, 'the chemist could detect, but it is only the veterinarian who can guarantee, the soundness of milk.'"

(*Recueil de Médecine Vétérinaire.*)

LATENT TUBERCULOSIS DEVELOPING INTO ACUTE, AFTER ABORTION, IN THE COW.

BY GÜNTHER.

IN human medicine it is a well-known fact that pregnancy is most dangerous to tuberculous women in 60 per cent. of such cases; in veterinary literature there is no mention of this.

The author mentions a case of a cow, which to all appearances was in excellent health, that slipped her calf; she began to cough rapidly, lost condition, and had to be destroyed thirty-six days afterwards. The lungs were in a state of caseous pneumonia and full of miliary tubercles, and the bronchial and mediastinal glands were greatly enlarged. The two pleuræ were adherent, and the small intestine covered with tubercular patches. The author is of opinion that the origin of the acute development of the disease was in the lungs, and that it spread to the intestine by swallowing the infected phlegm.

(*Deutsche tierärztliche Wochenschrift.*)

TUBERCULOSIS OF THE PHARYNX AND NEIGHBOURING PARTS.

BY P. B. RASMUSSEN.

THE author's statistics are obtained from the abattoir of Copenhagen during the years 1900-1904. Out of 252,425 animals, 80,504 were tuberculous, 4,708 extensively so. Out of 4,708 cases the tonsils were affected in 52, or 1·1 per cent.; usually both were involved.

Out of 4,708 cases, 228, or 4·84 per cent., had the subparotideal glands involved; in two they were so long as to give suspicion of neoplasms.

Out of 4,708 cases, 3,245, or 68·93 per cent., had the retro-pharyngeal glands involved; in some cases they gave the appearance of tumours.

Other observers in Copenhagen during the same period record 75,796 cases.

(*Maanedsskrift for Dyrlæger.*)

EXTERNAL OTITIS AS A SYMPTOM OF DISTEMPER IN THE DOG.

BY LANGE.

THE author has noticed that 50 per cent. of dogs that are attacked with distemper have external otitis. The secretion is more fluid than in the ordinary form, and the pain and inconvenience caused less intense. The entrance to the auditory canal is covered with wet eczema, which disappears of itself as the animal recovers.

(*Berliner tierärztliche Wochenschrift.*)

DIAGNOSIS OF RABIES.

BY SUZZANI.

THE author has systematically employed Negri's method for the diagnosis of rabies on 179 subjects, viz., 165 dogs, twelve cats, one ox, and one horse, furnished from the Pasteur Institutes of Milan and Florence (109 of them have been already reported on in the *Gazzetta Medica Italiana*, 1904, No. 28). In all the parasite was specially looked for in the cornu and cerebellum. The diagnosis was based on the form of the endocellular parasite, and communicated to the Institute before the results of the inoculation of control animals were known.

The author was only able to make three inoculations, viz., two cats and one dog, whose heads were sent to him direct; in all the others he only had portions of the cornu and cerebellum in Zenker's fluid sent to him. He recommends the following technique: A small portion of the cornu is removed and fixed in Zenker's fluid. After it has been fixed it is washed carefully in water for a few minutes, and then scraped with a sharp scalpel. The scrapings are then spread out on a slide and teased out carefully in water or very dilute alcohol. By this means a large number of cells are isolated, in which, with a little practice, the parasites are easily detected. This plan, the author states, has invariably enabled him to diagnose the disease if the animal is really rabid, and in those of which there are doubts he has done so by steaming sections by Mann's process.

This method is of great practical value from its simplicity and rapidity, and the author highly recommends it in cases of suspected animals. When the entire head is available, as is usually the case at Pasteur institutes, the cornu can be examined fresh, but if not the case, a few fragments are fixed in Zenker's fluid, left there for a few hours,

and the parasites looked for in the scrapings. If the result is negative, sections are stained by Mann's process; and if again negative, inoculations can be made, for, although extremely rare, it is quite possible that the animal may be infected without the parasites being present.

Out of the 179 cases under notice 107 were rabid; out of 102 the diagnosis was made by the method described, in the remainder by Mann's process. This was confirmed by inoculation.

(*Zeitschrift für Hygiene.*)

RABIES IN SICILY.

BY GRIGLIO.

RABIES appears to be extremely prevalent in the island, and the author, who is the Veterinary Inspector of the Bureau of Hygiene at Palermo, has seen 225 cases in men between the years 1887 and 1901. Between March, 1896, and February, 1905, he has seen 156 cases in dogs in Palermo and the suburbs, of which 107 presented clinical symptoms, and 49 were looked upon as being suspicious. There were 146 dogs, 3 cats, 1 pig, 2 horses, and 2 goats. The cases of persons applying for treatment at the Palermo Pasteur Institute were: 98 in 1897, 189 in 1898, 66 in 1899, 75 in 1900, 166 in 1901, 57 in 1902, 45 in 1903, and 67 in 1904.

In 1898 steps were taken to stop the disease by destroying homeless dogs, inspecting suspected ones, the use of the muzzle, and the imposition of a dog tax; but the last remained practically a dead letter on account of vested interests. The number of wandering homeless dogs destroyed was—in 1898, 2,939; 1899, 2,523; 1890, 2,274; 1901, 3,023; 1902, 2,224; 1903, 1,812; 1904, 1,123.

The season of the year had no influence on the frequency of the disease. Between March and August there were 20 cases; January, May, June, October, and November, 13; February and September, 11; July, 15; April, 9; and December, 5. The period of incubation varied from fourteen to one hundred and seventeen days, with an average of forty-nine days. The disease declared itself in the first month six times, in the second ten, in the third once, and in the fourth three times. Rabid dogs lived for from one to twelve days after the appearance of the first symptoms. The average mortality in persons bitten between the years 1887 and 1901 was 1 for those treated, 3·34 for those not treated.

(*Il Moderno Zooiatro.*)

GRANULAR VAGINITIS.

OBSERVATIONS have been made on 32,000 cases at the Bacteriological Institute of the Chamber of Agriculture of Saxony, and show that the best treatment is the injection of bacillol or iodine ointment. The stables and hind-quarters of the cows should be disinfected. It is also pointed out that one attack gives no immunity from a second.

(*Revue Générale de Médecine Vétérinaire.*)

A NEW TRYPANOSOMA DISCOVERED IN THE UPPER NIGER.

BY A. LAVERAN.

In conjunction with MM. Cazalbou and Pecaud, the author for the past two years has been engaged in studying trypanosomiasis in the Upper Niger. *Mbori*, *soumaya* and *baleri* have been described by the former, and in collaboration with Vallée and Panisset, Laveran has shown that mbori is only a local form of surra.

In animals that were inoculated at Segou, Laveran found the *T. Evansi*, one similar to that of horses in the Gambia (*T. dimorphon*), and a new one resembling that of soumaya, which he has termed *T. Cazalboui*. The trypanosoma of soumaya has the typical structure of the flagella, measures 21 μ by 1·5 μ, with the nucleus in the centre, the centrosome close to the posterior extremity, which is rounded, the protoplasm contains a number of fine granules, the membrane undulated and but slightly developed, and the flagella free. The *T. Cazalboui* is found in both equines and bovines, and small animals such as goats, antelopes and sheep are easily inoculated, while the rat, mouse, dog and guinea-pig are refractory. In horses that are naturally infected there are sudden rises of temperature, with œdema of the lower extremities. In the goat and sheep the chief signs are fever, emaciation and prostration, with, in some instances, kerato-conjunctivitis. The disease caused by the *T. Cazalboui* differs from mbori, and the chief centre is La Macina. Cazalbou and Pecaud think it is spread by the Tabanus, as the Glossina is rare on the Upper Niger.

(*Comptes rendus de l'Academie des Sciences.*)

EMPHYSEMA FOLLOWING ON THE SUBCUTANEOUS INJECTION OF ETHER.

BY M. F. FORGEOT.

The author states that in every case in which he has injected ether subcutaneously in this particular case a large, irregular, crepitating swelling rapidly formed from its volatilisation in the subcutaneous connective tissue. The animal was a colt suffering from strangles, and the dose used was 10 cc. M. Forgeot mentions that he cannot find any mention of such an accident in any of the text-books he has referred to.

In a few days the ether appeared to become absorbed, the crepitation ceased, but the swelling was soft, and pitted under the finger, and was hot and painful at the point where the puncture had been made. There was no tendency to suppuration, which at first was expected. The enlargement gradually subsided, but did not entirely disappear for from two to three weeks. Over the point of the injection there was a wet patch of perspiration that remained visible for several weeks. In light-coloured horses it left a permanent dark patch, which gives a curious appearance if the operation has been repeated several times.

The size of the swelling appears to depend on the breed, being largest in thoroughbred horses. The author makes the injection at the lower third of the neck, and the instruments and skin are carefully disinfected.

(*Recueil de Médecine Vétérinaire.*)

DEFORMATIVE OSTEO-PERIOSTITIS IN THE DOG.

BY MM. R. BISSAUGE AND L. NAUDIN, ORLEANS.

DEFORMATIVE osteo-periostitis in the dog is not a common disease, and if the few cases that have been published are any criterion, the clinical and histological appearances are not always identical. This accounts for the confusion that has arisen, the disease having been described under the names of diffuse osteo-periostitis and deformative osteitis, and it has also been mistaken for osteo-porosis, osteomalacia, and rachitis.

The case that is described was seen in a spaniel, aged 9, that had never been worked or used for sporting purposes, and was in reality a house dog. As far as is known, he had never had distemper. The dog was brought to the authors on account of acute lameness of the right fore leg, which was painful and slightly swollen over the metacarpo-phalangeal joint. The general condition was good, there was no fever, and his appetite was good; in fact, if anything, he was too fat.

The part was rubbed with iodine ointment and the lameness disappeared in a few days, but the diagnosis was uncertain, it being attributed to an injury to the joint as the dog ran about the stable, and it was probable that a horse had trod on him.

About a month later the dog again was lame but not so bad as at first, although the swelling had very greatly increased. On manipulation a diffused bony swelling was felt over both joints; that on the left, however, was not so large as the right. The general condition was not good; the animal was thin and he staggered in his walk, the fore legs being straddled wide apart, and the back arched; the hind limbs were quite healthy. It was then recognised that the dog was suffering from some general form of bone disease, and that internal remedies should be prescribed, not with any hope of cure, but with the hope of prolonging the animal's life, as he was a great favourite with his master. Cod-liver oil and biphosphate of calcium were prescribed, with the external application of iodine ointment to the affected part.

The general health improved but the local lesions gradually increased and spread to the lower portion of the hind limbs. The fore limbs were deformed by the new growths that formed about the shoulder joint. The posture of the dog was most awkward, and when he walked all four legs were straddled apart. He lay down and only got up with difficulty after he had been called repeatedly. He remained in this condition for a year, the lesions becoming more and more marked, both in size and number, especially about the articulations, and being painful to the touch.

The local applications were discontinued as being useless, but cod-liver oil, bi-sulphate of calcium, phosphorous and arsenic were given without any appreciable result. The dog lived for two years after the commencement of the attacks, but he became very emaciated and developed endocarditis. The treatment was changed to arsenic, iodide of potassium and digitaline, but without success. The respirations became so difficult as to threaten asphyxia, and finally the owner consented to have the dog destroyed.

A *post-mortem* examination was made at once. The bones of the limbs—tibia, humerus and radius—were all covered with excretions of a friable, porous nature that were easily detached, rubbed off or broken. The bones of the hock, knee, metacarpal and metatarsal, were all deformed and surrounded by a sheath that completely enveloped them. Contrary to what is generally seen the scapulæ coxis and several of the ribs were attacked, the lesions being in lines of granular, osseous vegetations, separated from each other by depressions where the bone remained healthy.

In the case reported the periosteum alone was diseased, but in the case under notice the whole bony tissue was affected, and the marrow completely changed in both structure and consistency. In the long bones in particular on being sawn in two, longitudinally, it was seen that the tissue was greatly altered. The dense structure was greatly reduced in thickness, was friable and spongy, and easily cut, as in osteomalacia. When cut across, the bones had a peculiar appearance, the bony tissue forming a ring about ½ cm. thick, contained between two others that were soft and spongy. The length of these bones was normal, but the diameter had increased, especially at the ends.

The lungs were extremely affected with emphysema, but there was no trace of pneumonia or chronic bronchitis. In the heart there were extensive valvular lesions; both mitral and bicuspid valves were thickened, and covered with white bony vegetations over almost their entire surface, also the valves in the pulmonary artery, but in a lesser degree. The liver and kidneys showed secondary alterations resulting from the condition of the heart; the liver was enlarged, studded over with infarctions, and the kidneys showed traces of nephritis.

Osteo-periostitis in the dog has not been carefully studied, and its nature and etiology is unknown. Several cases are described by Sievaux, who compares it with Paget's deformative osteitis of man. Certain authors look upon it as the result of trophic nervous troubles, but this is only a guess, there being no foundation for the opinion, and in this case the nerve centres were normal.

In this case, from the cardiac and pulmonary lesions it would almost appear as if it was of a rheumatic origin.

(Revue Générale de Médecine Vétérinaire.)

Correspondence.

PROSECUTIONS OF "VETERINARY QUACKS."

To the Editors of the VETERINARY JOURNAL.

SIRS,—On reading the VETERINARY JOURNAL for October, 1907, I noticed with interest your editorial and the report of the proceedings against W. J. Wilson at the Feltham court for prostituting the veterinary profession. My object in writing is to ask if something could not be done to protect the profession and its members in Australia by the Royal College of Veterinary Surgeons, by making an appeal to the Commonwealth Government asking them to insert clauses in their "Stock Diseases" Acts prohibiting any but fully

qualified men practising in any of our States. At the present time we have in West Australia some of the biggest wasters possible passing off as members of the Royal College of Veterinary Surgeons, London. I am of opinion that if only a few good letters were written in our daily papers pointing out the danger of allowing "rule-of-thumb vets." to tamper with one's animals, and also an appeal made from the Royal College direct to each Minister of Agriculture in the respective States, much good would result, and no doubt we should soon be able to prosecute in these States as you are doing in England, and rightly so, too. It is a scandalous thing to allow these ignoramuses to go on killing valuable animals and robbing the public with impunity.

Although only a layman in a most humble way, but a lover of animals, I will always do my best to put down quackery and to uphold the profession which has done so much for the poor dumb brutes who cannot defend themselves.

Yours, &c.,

TITUS LANDER,
Inspector S.P.C.A.

Perth, Western Australia,
December 1, 1907.

Books and Periodicals, &c., Received.

Journal of the Royal Army Medical Corps; The Tropical Agriculturist (Ceylon); Agricultural Journal (Cape of Good Hope); British Museum; The Twentieth Century Book of the Horse (Galvayne); The Psychology and Training of the Horse; Essentials of Veterinary Physiology for Veterinary Students (Noël Paton, 2nd Edition); The Cork Examiner.

Letters and Communications, &c.

Lieutenant Tapley; Lieutenant Schofield; Lieutenant Ryan; R. F. Stirling; J. Cameron; W. Russell; W. Clubb; C. W. Townsend; Captain Pallin; Captain Barry.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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Illustrations for reproduction should be in good black or dark brown on white paper or card.

Advertisements and all business matters relating to the JOURNAL should be addressed to the publishers, Messrs. Baillière, Tindall and Cox.

THE LATE COLONEL JOSHUA A. NUNN, C.B., D.S.O., C.I.E.,
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